Phantom Help File

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PHANTOM

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Table of Contents

Foreword 9

Part I Welcome to Phantom Help 12

1 Getting Help 13
2 Other Useful Phantom Resources 14
3 EULA (End User License Agreements) 15
4 Important Warnings and Cautions 34
5 Important Operational Notes and Safety Instructions 38

Part II Getting Started 44

1 Phantom Camera Control Unit Requirements 45
2 Preparing Your Computer 47
3 Installing the Phantom Camera Control Software 48
4 Installing the Phantom STG (Serial Tag Number) File 48
5 Define the Phantom Control Unit IP Address 49
6 IEEE 1394 Hardware and Driver Installation 51
7 Verify Camera Connection 53

Part III Quick Start Guides 56

1 Phantom Cameras via Phantom Camera Control (PCC) Application 57
2 Phantom Miro Touch-Sensitive LCD Cameras 62
3 Phantom 65 or HD-Series Cameras via On-Camera Controls 67

Part IV Phantom Camera Control Application - Help 70

1 The User Interface 71
- Menubar 73
- Toolbar 79
- Preview/Playback Panel 82
- Status Bar 83
- The Control Panels 84
  - Manager Control Panel Components 85
  - Live Control Panel Components 87
  - Play Control Panel Components 102

2 Step-by-Step Procedures 109
- Menubar Procedures 109
  - Cine Menu Procedures 109
    - Opening a Saved Cine File 109
    - Saving a Cine File 110
    - Saving All RAM to File, (MultiCine) 114
    - Saving All Flash to File, (Flash/CineMag) 118
    - Saving a Cine to Flash Memory 122

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Select&Save Cines to File ... 123
Camera Menu Procedures ... 134
Adding a Simulated Camera ... 134
Copy Parameters To... ... 136
Loading Camera Settings ... 138
Saving Camera Settings ... 139
Deleting All RAM Cines ... 140
Erasing Flash Memory ... 140
View Camera Properties ... 141
Assign a Secondary IP Address ... 142
Tools Menu Procedures ... 144
Tools - Image Processing Adjustment Procedures ... 144
Firmware Control (Nucleus) - Upgrading Camera Firmware Procedure ... 145
Enable/Disable Logging ... 148
Preferences - Phantom Camera Control Preferences ... 149
Window Menu Procedures ... 152
Tile Preview/Playback Panels ... 152
Auto Tile Preview/Playback Panels ... 152
Selecting an Open Preview/Playback Panel ... 153
Help Menu Procedures ... 153
Toolbar Procedures ... 154
Open a Saved Cine File ... 154
Save to File ... 154
Save All Cines From This Camera ... 158
Image Tools ... 162
Video Out ... 162
Snapshot ... 163
Preview/Playback Panel Procedures ... 164
Performing a White Balance Adjustment ... 164
Manager Control Panel Procedures ... 165
Individual Camera Control ... 165
Simultaneous Multiple (Group) Camera Control ... 165
Delete a Sub-Group, Camera, or Cine File ... 166
Opening a Cine File from Camera Memory or CineMag ... 166
Opening a Cine File Under the Files Group Tree ... 168
Live Control Panel Procedures ... 169
Camera Settings ... 169
Synchronize or Set the Internal Clock of a Phantom Camera ... 169
Specify the Time Zone Reference ... 170
Perform a CSR, (Current Session Reference), Calibration Adjustment ... 171
Perform a Black Reference Calibration Adjustment ... 173
Define the Image Pixel Bit Depth ... 174
Specify the Cine Memory Partitions ... 175
Define the Automatic Lens Control ... 176
Cine Settings ... 177
Define the Resolution ... 177
Define the Sample Rate ... 178
Define the Exposure Time ... 178
Define an EDR, (Extreme Dynamic Range), Exposure Time ... 180
Low Light ... 181
Define a Post Trigger Value ... 182
Advanced Settings ... 184
Define the Cine Advanced Options ... 184
Define the CineMag Option ... 185

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Define the Start/End of Recording Actions Parameters ... 186
Define the External Sync Parameters ... 187
Enable Real Time Output Parameters ... 193
Define the Acquisition Signals ... 193
Define the Trigger Settings ... 196
Define the Pretrigger Pin Is: ... 196
Define the Ready Signal Ends At: ... 197
Define the Miro/Strobe Pin Is: ... 197
Define the Starts In Option ... 198
Define the Auto Exposure ... 199
Define the Frame Rate Profile ... 201
Define the Image Content Trigger (Image-Based Auto-Trigger) ... 203
Define the Continuous Recording Parameters ... 205
Capture or Record Image Data ... 209
Trigger or Abort Recording ... 210
Play Control Panel Procedures ... 211
Cine Selection ... 211
Select the Playback Mode ... 212
Reviewing Cine File ... 213
Perform a Quick Search Through a Cine File ... 215
Edit a Cine File ... 217
Save a Cine File ... 220
View Frame Info ... 221
View Cine Info ... 221
View SAM-3 Signaling ... 222
Specify the Time Translation ... 225

Part V Phantom CineMag - Help 228

1 Defining the Operational Mode ... 229
2 Recording to a Phantom CineMag ... 231
3 Viewing a Cine File Stored in Phantom CineMag ... 236
4 Editing a Cine File Stored in Phantom CineMag ... 238
5 Erasing Files from the Phantom CineMag ... 240

Part VI Phantom Miro Control via "Touch-Sensitive" LCD Screens 242

1 The LCD Display Screens ... 243
LIVE PRE Display ... 244
Power Off Display ... 247
LIVE WTR Display ... 250
LIVE TRG Display ... 252
LIVE CST Display ... 254
PLAY CST Display ... 256
Edit/Save Display ... 259
Save Display ... 262
Delete Existing Recording Display ... 264
MultiCine Allocation Display ... 265
Reallocate Memory and Delete All Cines Display ... 267
Cine Screen Display ... 268
Image-Based Auto-Trigger Display ... 271
2 Step-by-Step Procedures ... 274

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Turning On the Phantom Miro Camera ... **275**
Changing Settings via the LCD Display ... **275**
Specifying the Trigger (Post Trigger Value) Point ... 276
Specifying the Sample Rate ... 276
Specifying the Resolution ... 277
Specifying the Exposure ... 277
Accessing the Power Off Display ... **278**
Performing a White Balance Adjustment ... **278**
Performing a Black Reference Adjustment ... **279**
Selecting an Exposure Index ... **279**
Formatting the CompactFlash Card ... **280**
Placing a Phantom Miro Camera Into the LIVE WTR (Recording) Mode ... **281**
Triggering the Miro Camera ... **281**
Viewing a Stored Cine File ... **282**
Viewing a MultiCine File Stored in the Type 1 Compact Flash Card ... **283**
Deleting a Stored Cine File ... **284**
Editing a Stored Cine File ... **284**
Saving a Cine File ... **285**
Power Off the Camera ... **287**
Using MultiCine with a Phantom Miro Camera ... **287**
Using Image-Based Auto-Trigger with a Phantom Miro ... **289**

Part VII Phantom 65 or Phantom HD Control via "On-Camera" Control Buttons **298**

1 Defining the Video Out Parameters ... **300**
2 The Monitor/ViewFinder Display Screens ... **301**
LIVE PRE/LIVE Display Screens ... **302**
SETUP Display Screens ... **306**
LIVE WTR/LIVE REC Display Screens ... **312**
LIVE TRG Display Screen ... **316**
LIVE CST Display Screen ... **320**
SELECT Display Screen ... **323**
PLAY CST Display Screen ... **326**
3 The "On-Camera" Control Buttons ... **330**
4 Using the "On-Camera" Control Buttons ... **332**
Defining the Operational Mode ... **333**
Switching Between the Preview, Zoom, and Threshold Features ... **334**
Changing the Camera's Operational States ... **335**
Define the Setup and Recording Parameters ... **335**
Providing a "Soft-Trigger" ... **338**
Play/Pause a Stored Cine File ... **339**
Edit a Stored Cine File ... **340**
Placing the Camera Back Into the Capture Mode ... **341**

Part VIII Phantom Cine Control Panel - Help **344**

1 Using the Phantom Cine Control Panel ... **344**

Part IX Functional Descriptions **348**

1 Black Reference/Current Session Reference Adjustments ... **348**
2 Frame Rate Tables ... **350**

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3 Image-Based Auto-Trigger 364
4 Image Processing Effects and Filters 366
5 Phantom CineMag Operational Modes 374
6 Phantom File Naming Convention 374
Phantom File Naming Convention Examples 377
7 Phantom STG, (Serial Tag Number), File 380
8 Supported File Formats 381
9 Supported Video System Formats 389
10 Versatile Dual HD-SDI 392

Part X Firmware Requirements 400

Index 405

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Phantom Help File

Last Updated: 3/18/2010

by Vision Research

Thank you for using Phantom! You chose the most powerful and easiest camera to discover the potential of your ideas. Phantom is a totally digital high speed imaging system capable of recording of high resolution images. If an ordinary photograph captures a moment in time, each high resolution Phantom image explores a remarkably unpredictable moment in time.

The Phantom Camera Control Software, and the On-Camera Control Buttons provides you with complete creative control over time. You can select any frame rate in increments of one frame per second. Shift the frame rate a little and move a scene to a slightly future viewpoint. Or shift the frame rate a lot and move a scene to some long passing moment in time. You will enjoy the ability of having seamless control of the duration, speed and time of every element of the shot.

With its two main components of the system the Phantom imager with advanced CMOS technology, and the Phantom Camera Control software, they form a system that provides high speed. high resolution image capture in digital cine format, with communications across multiple digital and analog protocols.

This operational guide has been meticulously designed to ease the anxieties associated with learning how to use your Phantom camera and its powerful features.

Enjoy the Phantom Experience!

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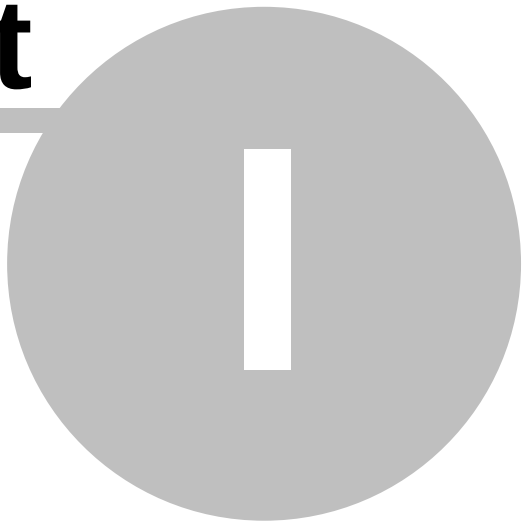
Part



1 Welcome to Phantom Help

Thank you for using Phantom! You chose the most powerful and easiest camera to discover the potential of your ideas. Phantom is a totally digital high speed imaging system capable of recording thousands of high resolution images per second. If an ordinary photograph captures a moment in time, each high resolution Phantom image explores a remarkably unpredictable moment in time.

The new version of the Phantom Camera Control Software application offers everything that the earlier versions included and much more. Virtually, every aspect of the program has been overhauled and improved, without sacrificing intuitive ease of use. This Help file will reduce the learning curve, and ease the anxieties associated with learning how to use your Phantom camera and its powerful features quickly.

Enjoy the Phantom Experience!

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1.1 Getting Help

As you would expect the Phantom Help File provides you with plenty of help on every aspect of using the Phantom Camera Control software application. In addition to this very comprehensive help file, which are actually a complete user manual, the Help File also has extensive context-sensitive help that you can access.

Using the help file

This help is designed to be used on-screen. It is extensively cross-linked so that you can find more relevant information to any subject from any location. If you prefer reading printed manuals a PDF version of the entire help has also been provided to you. This may be useful as a reference, but you will probably find that the active hyperlinks, cross-references and active index make the on-screen electronic version of the help much more useful.

Getting a printed help manual

Please don't try to print the HTML Help version of the help from the Microsoft help viewer, it would look terrible. You can find a formatted PDF version of the entire documentation designed for printing in the same directory the Phantom Camera Control application was installed.

As mentioned above, however, you will probably find that the on-screen version of the help is much more useful because of the hyperlinks and cross-references.

Quick Start Guides

See Quick Start Guides in the help for some basic tutorials to get you started using your Phantom camera.

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1.2 Other Useful Phantom Resources

If you have any questions not answered by this help system, please don't hesitate to contact our support center!

Are you a member of the PhantomZone user forum? No, click the PhantomZone logo or the following link to sign up now: http:\\www.visionresearch.com/phantomzone.

This is a great source for additional information on Phantom cameras in general, alerts and FAQ's, product news, software and hardware suggestions, and various discussion groups in particular.

Already a member, check out "What's New", just click the PhantomZone logo to sign in.

This web site, http://focus.visionresearch.com, offers news about Vision Research products and provides application notes, technical tips, FAQ's and general news of interest on the subject of high speed digital photography.

Vision Research proudly offers a hands-on, instructor-led course designed to expand your knowledge of Phantom Miro and v-Series camera operations using proven methodologies with Vision Research's award-winning Phantom Digital Imaging Systems. This course covers a full range of training from the basics of the Phantom system and its graphical user interface (GUI) to many advanced analysis features.

After completing this course, you will have the knowledge and practical understanding necessary to successfully utilize and deploy the Phantom Digital Imaging System to meet your imaging requirements. For more information please visit, http://www.visionresearch.com/index.cfm?sector=htm/files&page=Training

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ldconfig.c	libnss_compat-	2.2.3.so**	
libcrypt-2.2.3.so**			
sysctl.c	2.2.3.so**	libpthread-0.9.so**	libpcprofile.so*
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cat.c	true.c	fsck.c (and others)	swapon.c
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chmod.c	uname.c	agetty.c	gawk-3.1.5
(various			
chown.c	fuser.c	halt.c	files)
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files)			
chroot.c	(various files)	ifconfig.c,ifdown,ifup	mesg.c
cp.c	gzip/gunzip,uncompr	ifinit	passwd.c
cpio (various)	ess,zcat	insmod.c,	rgrep (various
files)			
date.c	loadkeys.c	insmod.static	smbclient
,smbmnt			
dd.c	mount, umount	insmod_ksymoops_cle	
,smbmount,smbumou			
df.c	(various files)	an	nt(various files)
dmesg.c	netstat.c	install-info.pl	arp.c
echo.c	pstree.c	ipmaddr.c	exportfs.c
false.c	runparts.c	iptunnel.c	grpck.c
hostname.c	sed-4.1.4 (various	kernelversion	pwck.c
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mv.c	ls-vdir.c	mkfs.c	kbdrate
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rm.c	su.c	route.c	losetup[7]
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sleep.c	depmod.c	setpci.c	libext2fs.a
stty.c	devfsd.c	shutdown.c	libext2fs.so.2.4
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1.4 Important Warnings and Cautions

Please review the following warnings and caution before using your Phantom camera.

Getting Started

1. When connecting to a Phantom camera do not open the Phantom Camera Control software until all installation procedures have been completed.
2. Never use an outdated Serial Tag Number (.STG) file and never mix .STG files. Using .STG files from other cameras may cause serious damage.
3. When connecting to a Phantom IEEE 1394 camera the IEEE 1394 card and drivers must be installed before installing the Phantom Camera Control software on your computer.
4. Do not use the IEEE 1394 drivers supplied with the card. Do not use Window's Install Wizards' feature.
5. If an IEEE 1394 Phantom camera does not appear in the Windows Device Manager>Sound, video and game controllers list, do not start the Phantom Camera Control software.

Quick Starts

1. Ensure that the CompactFlash Card is PROPERLY oriented before seating it into a Phantom Miro camera. DO NOT FORCE THE CARD INTO THE CAMERA. Failure to comply with this instruction may result in a serious camera failure requiring it to be returned to Vision Research for service.
2. Any cine files stored in the camera's memory must be deleted prior to powering down a Phantom Miro camera. Failure to comply with this procedure will cause the camera to run on battery power until the battery discharges completely.

Phantom Camera Control Application

1. When using a monitor to apply Image Processing effects, the White Balance control, and all brightness, contrast, gamma, and color adjustments should be changed only when using a monitor that is in correct adjustment. Occasionally, an operator will over adjust the monitor settings in extreme lighting conditions, such as in direct sunlight, in an attempt to get a better look at what he is trying to image. "Correcting" the appearance of images on a poorly adjusted monitor will have a negative result on cine file recordings that will later be viewed on a properly adjusted monitor under normal conditions.
2. White Balance Adjustment cannot be performed over an area with any saturated pixels.
3. Removing a Group or Sub-Group with multiple groups, cameras, or cine files under it will remove all the objects in the tree.
4. When utilizing the f-sync feature with this application, all cameras must be supplied an external trigger. If a soft-trigger is used to trigger the cameras, Vision Research cannot guarantee that the cameras will remain synchronized.

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Phantom CineMag

1. Be sure to Save all the cine files stored in Phantom CineMag you want to keep before erasing the Phantom CineMag Flash memory. This is an all-or-nothing selection, the memory can only be erased in its entirety, individual files cannot be purged separately.
2. To use the Phantom CineMag Erase Protect feature place the Erase Protect Switch, located underneath the Phantom CineMag, into the locked position, indicating the CineMag is in Erase Protect Mode. The Erase Protect Indicator will then be when locked.

Phantom Miro Control via "Touch-Sensitive" LCD Screens

1. If the battery charge indicator turns red, and you have an unsaved cine in memory you should immediately connect the camera to the power supply and save the cine. If you lose camera power you will lose any unsaved cine files.
2. Once a cine file is deleted it cannot be recovered. Be sure to save any cine file you wish to keep before deleting the cine file.
3. All cine files must be deleted from the camera's memory buffer prior to performing the Power Off Procedure. If you fail to comply with this caution, the camera will not power down, it will continue to run until the life of the battery is exhausted.

Phantom Video Player Application

1. Running more than one instance of the Phantom Video Player application will reset the application to live view only.

Image-Based Auto-Trigger

1. The Image-Based Auto-Trigger feature should never be used in applications where missed or false triggers cannot be tolerated or where a false trigger could cause harm to people or property.
2. The hardware signaling available in some Image-Based Auto-Trigger modes should be used only to synchronize multiple Phantom cameras together and should never be used to trigger or control any other external device or event.
3. CONSEQUENCES RESULTING FROM SYSTEM FAILURE, FALSE TRIGGERING OR MISUSE OF THIS FEATURE ARE THE SOLE RESPONSIBILITY OF THE USER.

SAM-3, (Signal Acquisition Module-3), Installation

1. The Data Acquisition Omni CD - Installation CD provides WDM-compliant device drivers and DLLs (version 5.0 or greater). Other Data Translation boards may not provide WDM-compliant files.
2. Use of a DT9800 Series board is restricted from being used at the same time another Data Translation board is in use, unless both devices provide WDM-compliant files.

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3. To prevent electrostatic damage that can occur when handling electronic equipment, use a ground strap or similar device when performing module installation procedures.
4. Before removing the DT3010 module from its anti-static bag you will need to discharge any static electricity by holding the wrapped board on one hand while placing your other hand firmly on a metal portion of the computer chassis.
5. Do not force the DT3010 module into place. Moving the board from side to side during installation may damage the bus connector. If you encounter resistance when inserting the board, remove the board and try again.
6. Selecting either the External option will cause the Phantom camera to lock up if the respective input signal is not available. If there is no external or IRIG-B clock source the Internal option MUST BE selected.

Sync Imaging (Camera Network Options)

1. When utilizing the fsync feature, all cameras must be supplied an external trigger. If a soft-trigger is used to trigger the cameras, Vision Research cannot guarantee that the cameras will remain synchronized.

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Connectors and Indicators

1. The connector references in this document are not intended, nor should they be used, as a cable schematic to build connection cables. Building your own cables can cause serious damage to the camera. Only connector cables provided by Vision Research should be used.

Phantom File Naming Convention

1. When saving your files as a series of still images, you must follow this naming convention or the individual images will be overwritten every time the camera stores additional Images.

Phantom STG (Serial Tag Number) File

1. Never use an outdated .STG file, or mix .STG files. .STG files from other cameras may cause serious damage to the camera.

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1.5 Important Operational Notes and Safety Instructions

All Phantom cameras and peripherals have been designed and produced according to the relevant safety standards. Although the mechanical design is extremely rugged and stable, the content high-tech micro electronics deserves a careful handling.

Please review the following important facts about your Phantom camera.

Important Operational Notes

1. If the Phantom cameras are to run in Capture mode for an extended period of time at 1,000 pictures per second, or greater, at the full resolution, or when the capture time is longer than 30 minutes use the pre-trigger feature to place the camera into the stand-by "LIVE" mode. This unique power management feature provides extended operation from battery packs, cooler operation and improved image quality. When the camera is in Live mode, the camera will return to full operation within in one picture after a trigger.
2. Phantom cameras can only store a finite number of images into the memory buffer based on the resolution, sample rate, image bit depth settings, and the memory size.
3. For best image quality, Vision Research recommends performing a "Current Session Reference" immediately before triggering if possible.
4. Cine files captured with this version can also be viewed with earlier versions of software. Still it is recommended to update the Phantom Camera Control application.
5. It is important to note that making a single setup and recording parameter change via the Phantom Camera Control application will change all the setup and recording parameters displayed on a Phantom 65, Phantom HD, or Phantom Miro attached monitor or viewfinder, as defined in the Phantom Camera Control>Live Control Panel.
6. Conversely making changes to the recording parameters via the On-Camera Control buttons, or Touch-Sensitive LCD Screens, will not change the settings in the Phantom Camera Control>Live Control Panel.
7. When using a Phantom CineMag the camera's Sample Rate will automatically be changed to the maximum allowable frame rate based on the selected Resolution when operating in Run/Stop Mode.
8. For a brief description of Run/Stop Mode operation, see: Functional Descriptions>Phantom CineMag Operational Modes.
9. Only the entire contents of the Phantom CineMag can be erased, the system does not allow a user to specify a single cine file to be erased.
10. Presently, both the Phantom 65 and Phantom HD only supports the use of a color ViewFinder.
11. A Phantom HD or Phantom 65 camera has an operational attribute such that the fans will start when the temperature is raised 5 degrees, then they will be turned off. As the camera warms an additional five degrees the fan will automatically come back on.
12. You should never do a firmware upgrade when running on battery power. Ensure the camera is connected to AC power.
13. If, for some reason, the firmware upgrade fails, the camera will likely need to be returned to Vision Research for service.

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14. Vision Research highly recommends that you contact our Technical Support staff prior to performing a firmware upgrade to a Phantom v9.0, v7.2, v7.1, v7.0, v5.1, v4.3, v4.2 camera models.

15. The Firmware Upgrade Process should never be used to load an earlier version of firmware that is already loaded into the camera, and must never be used with IEEE 1394 camera models.

16. The Image-Based Auto-Trigger feature should never be used in applications where missed or false triggers cannot be tolerated or where a false trigger could cause harm to people or property.

17. The hardware signaling available in some Image-Based Auto-Trigger modes should be used only to synchronize multiple Phantom cameras together and should never be used to trigger or control any other external device or event.

18. CONSEQUENCES RESULTING FROM SYSTEM FAILURE, FALSE TRIGGERING OR MISUSE OF THIS FEATURE ARE THE SOLE RESPONSIBILITY OF THE USER.

19. In order for a Phantom v4.0, v4.1, v5.0, v6.0, or v6.1 camera to communicate properly with the Phantom Control Unit, over an IEEE 1394 connection, the controller unit must use the following Microsoft IEEE 1394 drivers:

    a. 1394bus.sys, dated: May-4, 2001

    b. ochi 1394.sys, dated: May 4, 2001

Important Safety Instructions

General

Do not open the product; there is no user serviceable parts inside. All maintenance and service work should be performed by qualified service personnel. The camera's are intended to be used in restricted access areas.

Installation

Do not expose your cameras and peripherals to excessive heat, moist and dirt. They are intended to be used in a controlled environment, unless precautions have been taken for outdoor use.

The cameras and peripherals should only be powered from an appropriate DC power supply that fulfills the local safety and EMC demands or the appended AC adapter.

Do not install the camera in an excessively humid environment or near water.

Avoid liquids or any foreign object to get into the product.

The unit must be placed in a sufficiently ventilated area; the ambient temperature should not exceed the specified temperature range.

It is important that ventilation air can move freely around the unit.

Operating Temperature

The Phantom cameras are designed to operate satisfactorily in an environment where the ambient temperature is, for a:

Phantom v710, v640, v310, v210, v12.1; between 0°C and 40°C at 8% to 80% relative humidity.

Phantom v10, v7.3, v5.2; between 10°C and 40°C at 80% relative humidity non-condensing at 5°C.

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Phantom 9.1; between -10°C and 50°C at 80% relative humidity non-condensing at 5°C.

Phantom Miro Airborne; between -30°c to 50°c; Mil-Std-810G Method 502.5, Proc III, Mil-Std-810G Method 501.5, Proc II, III at 95% non-condensing: Mil-Std-810G Method 507.5 Proc I, II.

Phantom Miro eX4, Miro eX2, Miro eX1; between 0°C and 50°C.

Phantom Miro 3; between 0°C and 40°C.

Storage Temperature

Store the camera in a dry location, storage temperature must be within, for a:

Phantom v710, v640, v310, v210, v12.1, v10, v9.1, v7.3, v5.2; between -10°C to 55°C.

Phantom Miro eX4, Miro eX2, Miro eX1; between 20°C and 70°C.

Altitude Operating

Phantom v12.1: Not specified.

Phantom Miro Airborne: Sea level to 40,000 feet; Mil-Std-810G Method 500.0 Proc III, (Operating)

Phantom Miro Airborne: -500 to 50,000 feet; Mil-Std-810G Method 500.0; Proc III, (Non-Operating)

Vibration

Phantom v710, v12.1: 0.25G, 5-500 Hz, all axes (operational).

Phantom v640, v310: 25G, 5-500 Hz, all axes without CineMag.

Phantom v210: 0.25G, 5-500 Hz, all axes without CineMag.

Phantom Miro Airborne: Functional: 0.20g2/Hz for 1 hour in each of the three orthogonal axes; Endurance: 0.83g2/Hz for 1 hour in each of the three orthogonal axes; Mil-Std-810G Method 514.6, Proc I

Operational Shock

Phantom v710, v640, v310, v210, v12.1: 30G, half sine wave, 11 ms, 10 times all axes (without CineMag or lens) to Mil-Std-810 G

Non-Operational Shock

Phantom v210: 33G, half sine wave, 11ms, all axes without CineMag.

EMI/RFI

Phantom Miro Airborne: Passed; EN-55033A, IEC-61000-3-2 and 3-3, EN-55024, EN-50082, IEC-61000-4-2

Acceleration

Phantom Miro Airborne: 6g for 1 minute on all axes; RTCA/DO-160E Section 7.3.3 Crash Safety Sustained

Acoustic (Susceptibility)

Phantom Miro Airborne: 150 dBA operational, 170 dBA storage

Shipping

When shipping the Phantom cameras and accessories, use the carton in which the unit was originally delivered. If you must frequently ship your imager, you may wish to purchase an accessory carrying case that has been designed for this purpose.

Lasers Precautions

A laser beam focused on the sensor of a Phantom camera, either directly or by reflection, can cause permanent damage to the sensor. Any laser powerful enough to produce

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localized heating at the surface of the sensor will cause damage, even if the camera power is off. A sensor damaged by laser light is NOT covered by warranty.

FCC Declaration Not Obligatory for CE

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

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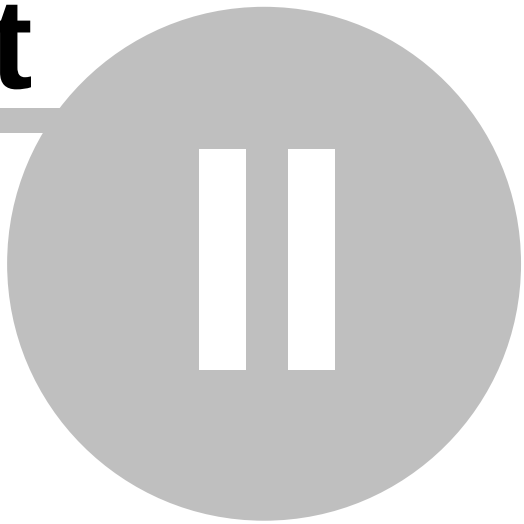
Part



2 Getting Started

Although the Phantom high speed imaging system comes with all the software installed, and ready for use, if you purchased your Phantom Control Unit, PC/Laptop), from Vision Research. The topics in this section provide recommendations and instructions if:

- You're upgrading to a new software version.
- You've purchased an additional software licence for installation on another computer,
- You've purchased a Phantom Control Unit from a vendor other than Vision Research.

These instructions detail the minimum system recommendations and preparation, program and Serial Tag Number (.STG) file installations, and how to verify your controller is connecting properly to the Phantom camera.

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2.1 Phantom Camera Control Unit Requirements

In this topic we will detail the minimum system requirements:

	FOR CONTROL OF		
	PHANTOM V710, V640, V310, V210, V12-SERIES, V10, OR V9-SERIES CAMERA	**PHANTOM MIRO-SERIES V7-SERIES, V6-SERIES, V5-SERIES, OR V4-SERIE CAMERA**	**PHANTOM CAMERA CONTROL SOFTWARE SUPPORT ONLY**
SYSTEM TYPE	IBM-PC or compatible	IBM-PC or compatible	IBM-PC or compatible
MICROPROCESSOR	Pentium-class 1.7GHz or higher	Pentium-class 1.4GHz or higher	Pentium-class 1.7GHz or higher; (Phantom v9, v10, and v12 Series, Phantom v710, v640, v310, v210) Pentium-class 1.4GHz or higher; (Phantom Miro, v4, v5, v6, and v7 Series)
OPERATING SYSTEM (1)	Microsoft Windows 2000 + Service Pack4 Microsoft Windows XP Pro + Service Pack3 (32 & 64 Bit) Windows XP Tablet Edition, Microsoft Windows Vista Business Edition (32 & 64 Bit) Microsoft Windows Vista Enterprise Edition (32 & 64 Bit) Microsoft Windows Vista Ultimate Edition (32 & 64 Bit) Microsoft Windows 7 (32 & 64 Bit)	Microsoft Windows 2000 + Service Pack4 Microsoft Windows XP Pro + Service Pack3 (32 & 64 Bit) Windows XP Tablet Edition, Microsoft Windows Vista Business Edition (32 & 64 Bit) Microsoft Windows Vista Enterprise Edition (32 & 64 Bit) Microsoft Windows Vista Ultimate Edition (32 & 64 Bit) Microsoft Windows 7 (32 & 64 Bit)	Microsoft Windows 2000 + Service Pack4 Microsoft Windows XP Pro + Service Pack3 (32 & 64 Bit) Windows XP Tablet Edition, Microsoft Windows Vista Business Edition (32 & 64 Bit) Microsoft Windows Vista Enterprise Edition (32 & 64 Bit) Microsoft Windows Vista Ultimate Edition (32 & 64 Bit) Microsoft Windows 7 (32 & 64 Bit)
ADMINISTRATIVE PRIVILEGES	Required for all Microsoft Operating Systems	Required for all Microsoft Operating Systems	Required for all Microsoft Operating Systems
RAM MEMORY	4.0GB	512MB	4.0 gigabytes recommended; (Phantom v9, v10, and v12 Series, Phantomv710, v640, v310, v210) 512MB (Phantom Miro, v4, v5, v6, and v7 Series)

(1) All Microsoft Windows Operating System must be English Versions.

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	FOR CONTROL OF		
	PHANTOM V710, V640, V310, V210, V12-SERIES, V10, OR V9-SERIES CAMERA	PHANTOM MIRO-SERIES V7-SERIES, V6-SERIES, V5-SERIES, OR V4-SERIE CAMERA	PHANTOM CAMERA CONTROL SOFTWARE SUPPORT ONLY
HARD DRIVE SIZE	80 Gigabytes Minimum	40 Gigabytes Minimum	80 gigabytes; (Phantom v9, v10, and v12 Series, Phantom v710, v640, v310, v210) 40 gigabytes minimum available space; (Phantom Miro, v4, v5, v6, and v7 Series)
CD-ROM DRIVE	Read/Write Any Speed	Read/Write Any Speed	Read/Write Any Speed
MONITORS	UltraXGA 1284x1024x24bit Large Fonts	SVGA 1024x768x24bit Small Fonts (Phantom v4 Series) UltraXGA 1284x1024x24bit Large Fonts (Phantom v5 Series, v6 Series, and v7 Series	UltraXGA 1284 x 1024 x 24bit large fonts; (Phantom v5, v6, v9, v10, v12 Series, v710, v640, v310, and v210) SVGA 1024 x 768 x 24bit color small fonts; (Phantom Miro and v4 Series)
ETHERNET	Gigabit Ethernet NIC with Jumbo Frame Support	10/100Mb Ethernet NIC (Phantom v4 Series, v5 Series, v6 Series, v7.0, andv7.1) Gigabit Ethernet NIC with Jumbo Frame Support	Gigabit Ethernet Jumbo Frame Support; (Phantom v7.2, v7.3, v9, v10, and v12 Series, v710, v640, v310, v210) NIC 10/100 or higher card installed; (Phantom Miro, v4, v5, v6 Series, v7.0, v7.1)
IEEE 1394 (OBSOLETE) (Phantom v4.0, 4.1, v5.0, v6.0, and v6.1)	N/A	OHCI IEEE 1394 Host Controller with NEC chipset, PCI card (desktops) or PCMCIA card (laptops)	OHCI IEEE 1394 Host Controller with NEC chipset, PCI card (desktops) or PCMCIA card (laptops

NOTE

A more powerful computer will deliver faster display and playback, as well as shorter save and download times.

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2.2 Preparing Your Computer

In this topic, we will be detail the recommended hardware preparations for:

Recommended for Desktop and Notebook Phantom Control Units

Maintenance of your system's hard drive is recommended for all software installations. Cine files captured by your Phantom camera are large. For best system performance, run the following routine maintenance tasks before installing the Phantom software.

1. Backup all data files. Archive (off-load) cine files that are rarely accessed.
2. From Windows System Tool, run Disk Cleanup on all installed hard drives.
3. From Windows System Tool, run ScanDisk on all installed hard drives.
4. From Windows System Tool, run Disk Defrag on all installed hard drives.
5. From Windows Outlook, set a reminder to routinely run ScanDisk & Disk Defrag.
6. Disable virus protection software and close all open programs during the installation process.

Recommended for Recently Serviced Cameras

Are you re-installing your camera on your system after factory service, upgrade, or repair, if so, you received the latest release version of software? Before you can use the new version of the software, you must first completely remove all earlier versions of the Phantom Camera Control Software, on all the computers used to control this camera.

1. From Windows Control Panel, run Add & Remove Programs.
2. Uninstall all earlier versions of Phantom software from all installed hard drives. If you've created a Desktop shortcut for Phantom, delete it manually.
3. From Windows Explorer, find and delete the following files from all installed hard drives:
   - ph1394.sys
   - ph1394.dll
   - ph1394.inf
   - phcon.dll
   - phint.dll
4. From Windows Explorer, find and delete all earlier .STG files for this camera from all installed hard drives. (*.STG). When the camera is first connected to the controller, it will automatically download the updated ".STG" file.

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Recommended for Software Upgrades

Are you just upgrading from an earlier version of Phantom software? If so you must first completely remove all earlier versions of the Phantom Camera Control Software.

1. From Windows Control Panel, run Add & Remove Programs.
2. Uninstall all earlier versions of Phantom software from all installed hard drives. If you've created a Desktop shortcut for Phantom, delete it manually.
3. From Windows Explorer, find and delete the following files from all installed hard drives:
   - ph1394.sys
   - ph1394.dll
   - ph1394.inf
   - phcon.dll
   - phint.dll

2.3 Installing the Phantom Camera Control Software

After verifying your system meets the system recommendations and preparing your computer requirements, you are ready to install the Phantom Camera Control Software The Phantom installation CD contains all the files required for installation and operation of the Phantom camera. It also includes the 'stg' file for your camera.

1. Disable virus protection software and close all open programs during the installation process.
2. Place the Phantom installation CD in the CD-ROM drive. If AutoStart is enabled on your system, the setup begins automatically. If AutoStart is not enabled, go to next step.
3. Using Windows Explorer browse to the CD and double-click autorun.exe.
4. The Phantom InstallShield will automatically start and guide you through the software installation process.
5. If you are asked to add the Phantom Application to a list of firewall approved applications, do so, or you will not be able to connect to a camera.

CAUTION

Do not open the Phantom Camera Control software until all installation procedures have been completed.

2.4 Installing the Phantom STG (Serial Tag Number) File

Each Phantom camera has a unique serial tag number file. This file is known as the camera's '.stg' file containing all the factory calibrations and settings essential for the proper operation of your Phantom camera. The Phantom installation CD, supplied with each new or newly serviced camera, includes the '.stg' file for the camera.

The Serial Tag Number files use the file extension .STG and resides in the Phantom directory on the controlling computer's hard drive. These files are specific to each camera manufactured, and store the factory settings and various lookup tables for the image sensor based on the 4-Digit Camera ID

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number. The information in this file is also stored (duplicated) in the camera's non-volatile flash memory. Under normal camera operation, this information is read by the Phantom application each time the software is started or each time a camera is accessed over the network. When started, the application first tries to read the factory settings from the computer .STG file. Should the control unit not find the appropriate .STG file on the computer it reads the settings from the camera's non volatile memory..

On the flip side, if the Phantom application is started or if the camera is accessed over the network and no .STG file resides on the hard drive, the Phantom application will automatically create a .STG file on the controlling computer's hard drive using the information residing in the camera flash memory.

If for any reason the Phantom application cannot read the .STG information from the camera's non volatile memory, or from a .STG file in the Phantom directory on the hard drive, the software will prompt the user for intervention. In the event that the appropriate .STG file is not available, the application will load a default set of information. If the default information is written to the non-volatile Flash memory, the camera will still operate but the image quality will be less than optimum.

CAUTION

Never use an outdated .STG file, and never mix .STG files. Using .STG files from other cameras may cause serious damage.

Vision Research keeps copies of the .STG files on record and if needed a copy can be obtained via email by contacting us.

Vision Research recommends making a backup copy of your camera's .STG file to store in a safe place. We also recommend placing a copy of this file in a temporary folder somewhere on your hard drive in the event you need to restore the camera's factory calibration settings.

When the camera is first connected to the controller, it will automatically download the '.stg' file to the Phantom folder. Normally, this folder is C:\Program Files\Phantom. Therefore, you MUST copy the file from the CD, and use Windows Properties to disable the READ ONLY attribute of the .STG file after it's copied to the hard drive.

2.5 Define the Phantom Control Unit IP Address

In this topic we will describe the process to:

Define an IP Address to the Phantom Control Unit

1. From Windows' Start button, go to Settings>Network and Dialup Connections.
2. Right-click Local Area Connections>Properties to view a list of components used by your system.
3. Select Internet Protocol (TCP/IP).
4. Click the Properties button.
5. When the Internet Protocol (TCP/IP) properties' box opens:
   a. Select Use the Following IP Address and enter the following:
      1) IP Address: 100.100.100.1

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NOTE

If multiple Phantom Control Units will be used to access the same Phantom cameras, each controller unit requires a unique IP Address. For example: Controller 1: 100.100.100.1 (255.255.0.0); Controller Unit 2: 100.100.100.2 (255.255.0.0), etc.

1) Subnet mask: 255.255.0.0 or (255.255.255.0 for v7.0 only)

b. Select Use the Following DNS and leave the entry blank.

c. Click OK to complete the setup.

Connect the Phantom Camera to the Control Unit via Ethernet

1. Connect one end of the Ethernet cable to the 8- or 6-pin Ethernet connector on the camera's rear panel.

NOTE

On a Phantom v7.0 camera this is a 6-pin connector is labeled IOIOI .

2. Connect the other end of the Ethernet cable to the RJ-45 Ethernet interface on the control computer.

NOTE

Most Ethernet Hubs do not permit the use of crossover cables. Therefore, a straight-thru cable is required. However, some Ethernet Layer 2 and Layer 3 switches have the capability of automatically detecting the cable type and adjust their pin-outs internally.

3. Connect 24-36VDC power to the camera. You may use the AC adapter supplied with your camera, a battery pack, or other DC power supply. Wait for the Power LED and the Capture LED on the camera's rear panel to stop flashing and remain lit.
4. Observe the Ethernet Link LED on the camera and the controller. They indicate the camera and the controller are communicating.
5. You may now start the Phantom software by double-clicking the Phantom icon on the Windows' Desktop.

Verify the Communication Between the Controller Unit and the Camera Over Ethernet

1. Click the Windows Start button and select the Run command.
2. Type: cmd, and click the OK button.
3. Type: ping <IP Address of the camera> at the C:\ prompt in the C:\Windows\system32\cmd.exe window.
4. Click Enter.

a. When properly installed the camera replies to the Ping Request.

b. Should Phantom Control Unit fail to detect the camera:

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1) Unplug the Cat-5 cable from the Phantom Control Unit computer, and ensure the proper cable type is being used.
2) Re-insert the proper cable.
3) Verify the TCP/IP Addressing information is correct.
4) Shutdown the Phantom Control Unit computer.
5) Remove power from the camera.
6) Restart the Phantom Control Unit computer, then
7) Re-apply power to the camera.
8) Ping the camera again to verify the Phantom camera replies to the Ping Request.

NOTE

If you still are unable to establish and verify the connection, please contact Vision Research Technical Support.

2.6 IEEE 1394 Hardware and Driver Installation

For obsolete Phantom v4.0, v4.1, v5.0, v6.0, and v6.1 cameras only

Required Hardware for Desktop and Notebook Computers: If you plan to use an existing desktop or notebook computer to control a Phantom camera, you must first install and configure an IEEE 1394 card into your desktop or notebook computer. Please contact Technical Support for the latest compatible IEEE 1394card recommendations, and current drivers.

You may often hear IEEE 1394 referred to as FireWire™; Apple Inc.'s trademarked name for this communication standard.

CAUTION

The IEEE 1394 card and drivers must be installed before installing the Phantom Camera Control software on your computer.

In this topic we will describe the process to:

Installing the IEEE 1394 Card

1. Following your computer manufacture's instructions for installing additional cards, insert a PCI OHCI Compliant IEEE 1394 card in any open PCI card-slot on the motherboard, or insert the PCI OHCI Compliant IEEE 1394 PCMCIA 2 card in the PCMCIA slot of your notebook computer.
2. Click the Windows' Start button, and select Settings>Control Panel>System Hardware>Device Manager option.
3. Scroll down through t Device Manager list to locate PCI OHCI Compliant IEEE 1394 Host Controller.
4. Double-click Host Controller. From the display tabs, select the Driver tab, then click the Update Driver button.
5. Locate and install the Windows' PCI OHCI Compliant IEEE 1394 Host Controller driver.

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CAUTION

Do not use the drivers supplied with the card. Do not use Window's Install Wizards' feature.

6. Notebooks generally have two PCMCIA slots. Repeats Steps 3-5 for the second slot.

Installing the Phantom Camera Driver (IEEE 1394 Cameras Only)

1. Connect 24VDC power to the camera. Before proceeding, wait for the Power LED and the Capture LED to stop flashing and stay lit.
2. Connect one end of the FireWire cable to the controller, then connect the other end of the cable to the six-pin connector marked IEEE 1394 on the cameras rear panel. (Phantom v4.0, v4.1, v5.0, v6.0, and v6.1 Cameras only)
3. From Windows, right click My Computer, select Properties.
4. Click Device Manager button.
5. Scroll down through the Device Manager list to locate: Other Device - Unknown Device.
6. Double-click Unknown Device. Select the Driver tab, from the display of tabs, then click the Update Driver button.
7. When the Wizard opens, click Next.
   a. From the list that appears, select: Display a list of all drivers in a specific location so you can select the driver you want.
   b. Click Next. From the list of hardware that appears, scroll down to select: Sound, video and game controllers.
   c. Click Next. From the list that appears, click the Have Disk button.
   d. For Windows 2000 Pro, when prompted for location, enter C:\Program Files\Phantom\Win2K Drivers; click OK. For Windows XP Pro when prompted for location, enter C:\Program Files\Phantom\WinXP Drivers; click OK.
   e. Select PH1394.inf, from the list that appears, then click OK.
   f. Select Phantom Camera when the Select Device opens, click OK.
   g. Click Next to install the driver. When prompted, click Finished.
   h. Reboot your computer.

NOTE

These Phantom Camera Driver must be installed via the Device Manger. If Windows auto-detection of New Hardware starts, close the dialogue box and proceed with Step 3 above.

Verifying the IEEE 1394 Communication Connection

1. Open the Windows Device Manager and locate the “Sound, video and game controllers” entry, and click on the Plus (+) sign to the left of the entry.
   a. If the Phantom camera is in the “Sound, video and game controllers” list, then installation is complete and the connection to the Phantom Control Unit has been verified. Exit the Device Manager.

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You can now start the Phantom Camera Control software by double-clicking the Phantom icon on your windows desktop.

b. If the Phantom camera is not in the “Sound, video and game controllers” list, then installation is not complete and the connection to the Phantom Control Unit has failed.

1) Unplug the network connection cable from the Phantom Control Unit computer, then re-insert it.

2) Check the list again to verify if the Phantom camera appears.

c. If the Phantom camera is still not detected:

1) Shutdown the Phantom Control Unit computer.

2) Remove power from the camera.

3) Restart the Phantom Control Unit computer, then

4) Re-apply power to the camera.

5) Check the list again to verify if the Phantom camera appears.

CAUTION

If the Phantom Camera still does not appear on the list, do not start the Phantom Camera Control software.

NOTE

If you are still unable to establish and verify the connection, please contact Vision Research Technical Support.

2.7 Verify Camera Connection

Ethernet Camera Models

1. Click the Windows Start button and select the Run command.
2. Type: cmd, and click the OK button.
3. Type: ping <IP Address of the camera> at the C:\ prompt, in the C:\Windows\system32\cmd.exe window,
4. Click Enter.

NOTE

The camera will reply to the Ping Request if properly installed.

Phantom Camera Not Detected via Ethernet Connection

If the Phantom Control Unit fails to detect the camera:

1. Unplug the Cat-5 cable from the Phantom Control Unit computer, and ensure the proper cable type is being used.
2. Re-insert the proper cable.
3. Verify the TCP/IP Addressing information is correct.
4. Shutdown the Phantom Control Unit computer.

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5. Remove power from the camera.
6. Restart the Phantom Control Unit computer.
7. Re-apply power to the camera.
8. Ping the camera again to verify the Phantom camera replies to the Ping Request.

NOTE

If you still are unable to establish and verify the connection, please contact Vision Research Technical Support.

IEEE 1394 Camera Models

1. Open the Windows Device Manager and locate the “Sound, video and game controllers” entry, and click on the Plus (+) sign to the left of the entry.

Phantom Camera Detected via IEEE 1394 Connection

If the Phantom camera is in the “Sound, video and game controllers” list, then installation is complete and the connection to the Phantom Control Unit has been verified.

You will now have to:

1. Exit the Device Manager.
2. Remove power from the Phantom camera.
3. Restart the Phantom Control Unit computer, then
4. Re-apply power to the camera.

Phantom Camera Not Detected via IEEE 1394 Connection

If the Phantom camera is not in the “Sound, video and game controllers” list, then installation is not complete and the connection to the Phantom Control Unit has failed.

You will now have to:

1. Unplug the network connection cable from the Phantom Control Unit computer, then re-insert it.
2. Check the list again to verify if the Phantom camera appears.
3. Shutdown the Phantom Control Unit computer.
4. Remove power from the camera.
5. Restart the Phantom Control Unit computer.
6. Re-apply power to the camera.

NOTE

If Windows detects the Phantom camera as a “New Hardware Device Found” follow the Phantom Camera Installation process.

7. Check the list again to verify if the Phantom camera appears.

NOTE

If you are still unable to establish and verify the connection, please contact Vision Research Technical Support.

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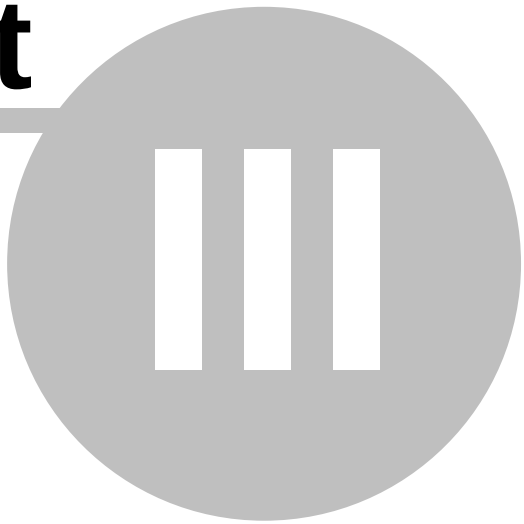
Part



3 Quick Start Guides

Updated: Thursday, March 18, 2010

Welcome to the Quick Start Guides for your Phantom camera.

The Quick Start Guides in this section are designed to provide a quick introduction on using a Phantom camera with the Phantom Camera Control application, Touch-Sensitive LCD Screens, and On-Camera Control Buttons. They are intentionally kept brief so that you can start using your camera as quickly as possible. The objective of these Quick Start Guides is not to teach you every single detail of the Phantom Camera Control applications, Touch-Sensitive LCD Screens, or On-Camera Control Buttons, but familiarize you with the basic procedures necessary to use your camera.

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3.1 Phantom Cameras via Phantom Camera Control (PCC) Application

This Quick Start Guide aims to provide 6 easy steps to get started using your Phantom camera.

For full details on the procedures described in the guide, please refer to the Step-by-Step Procedures section.

STEP-BY-STEP PROCEDURES

Pre-Installation Check

The Phantom cameras have a few requirements, which must be met before you are able to use it.

1. The Phantom Control Unit must have either the Microsoft Windows NT, Window XP Pro, VISTA Business Edition or Windows 7 operating system installed.
2. The Phantom Control Unit's Firewalls must be turned off. (Contact your IT Group if necessary.)
3. The Phantom Control Unit must be set to IP Address: 100.100.h.h; (where h.h is a unique host identifier, i.e., 100.100.100.1) with a Sub-network Mask set to: 255.255.0.0.

   For step by step instructions to change IP Address, go to: Changing IP Address on the Phantom Control Unit.

Connecting Camera and Controller Unit Operation

1. Connect the Power Supply to Phantom camera.
2. Connect the Ethernet cable to Phantom camera and the Phantom Control Unit.
3. Connect Capture Cable to Phantom camera.
4. If using an external trigger, connect it to Trigger BNC, (Red), of the Capture Cable.
5. Attach the lens to the Phantom camera.
6. Boot Up the Phantom Camera Control Software on Phantom Control Unit, then
7. Wait for the “Ethernet Connected” message window to appear just above the Phantom Control Unit's Taskbar.
8. Setup and record a cine file, (image data).

Capturing Video via the Phantom Camera Control Application

1. If the Manager Control Panel is not the active dialogue window,
2. Click on the Manager tab, then
3. Double mouse-click on the Phantom camera to be used to record with from the Cameras Group.
4. Open the Live Control Panel by clicking on the Live tab.
5. Under Cine Settings define the:
   a. Set the Resolution, 800x600 by selecting the option from the pull-down selection list.
   b. Sample Rate, (also referred to as the Frame Rate or Recording Rate), i.e., 200pps by selecting the option from the pull-down selection list.

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c. Set the Exposure Time to the maximum available in the selectable pull-down list.

d. Set the EDR, (Extreme Dynamic Range) exposure time to zero (0) by selecting the option from the pull-down selection list.

e. Post Trigger to one (1) by:

1) Enter a 1 into the Post Trigger entry field, alternatively

2) Move the Trigger Position slider to the right.

5. Under Advance Settings set the External Sync>Sync Imaging parameter to Internal by selecting the option from the pull-down selection list.
6. Click on the Camera Settings selector, and
7. Click on the CSR button to perform a Current session Reference.
8. Using the Toolbar icons, click on the Zoom Actual Size, , icon.
9. View the preview image in selected Phantom camera's Preview Panel, and adjust the Resolution, Sample Rate, and Exposure Time for optimum viewing.

NOTE

The Live Status display is active indicating the camera is Preview Mode and is not recording any image data.

10. Click on the Capture button to put selected Phantom camera into Record Mode.

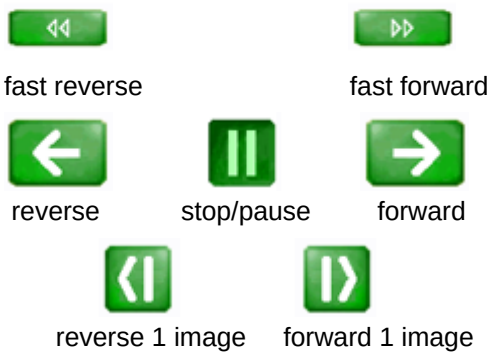
NOTE

The Live and Rec Status displays are both active indicating the camera is still in Preview Mode and is also in Record Mode, (capturing image data).

11. Trigger the Phantom camera, to stop recording, using any of the methods below:
    a. Click on the Trigger or Stop Recording button, alternatively
    b. Provide a switch closure or an external trigger signal, (a TTL pulse), to the Trigger BNC connector of the Capture Cable.
12. Playback the recorded cine, (image data), file.

Playback Operation

1. Open the Play Control Panel by clicking on the Play tab.
2. Use the Playback controls to view recorded images:



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3. Edit the record cine file:
   a. Locate the first image of the cine file to be saved,and
   b. Click on the Mark-In button.
   c. Locate the last image of the cine to be saved, then
   d. Click on the Mark-Out button.
4. Click the Mode button, and
   a. Select, (check), Limit to Range.
   b. Deselect, (uncheck), Repeat.
5. Playback the preferred, (edited), cine.
6. Save, (download), the edited cine to the hard drive of the Phantom Control Unit.

Save Cine File to the Controller Unit

1. After completing the Playback Operations procedure,
2. Click the Save Cine... button at the bottom of the Play Control Panel.
3. In the Save Cine dialogue window:
   a. Create a Windows Folder to store the cine file(s) into.
   b. Enter a distinct/unique file name for each cine file in the File name: entry field.
   c. From the Save as type pull-down selection list select the Cine Raw, *.cine file format.
   d. Click the Border Data... button, (optional), and select the desired information to be displayed.
   e. Click the Save button to begin downloading the cine file from the Phantom camera to the Phantom Control Unit's hard drive.
4. Ensure the cine file you just downloaded, has been stored in the Phantom Control Unit, and is not corrupted before deleting the cine file from the camera:
   a. Click on the Cine Menu, and
   b. Select the Open File command.
   c. In the Open Cine dialogue window:
      1) Navigate to the Windows Folder containing the cine file you just downloaded.
      2) Highlight the cine file to be opened.
      3) Click the Open button.
   d. From the Play Control Panel, play the saved cine file.

Get Ready to Record Again

After ensuring the cine file you just downloaded, has been saved to the Phantom Control Unit's hard drive, and was not corrupted:

1. Via Manager Control Panel:
   a. Open the Manager Control Panel by clicking on the Manger tab.
   b. Highlight the recorded cine file under the selected Phantom camera, then

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c. Click the Remove From Tree button to erase the image data stored in the camera's DRAM.

d. Click the OK button when the "Delete all cines from camera?" warning message appears.

RESULT: Camera is now in Live Mode as indicated by the Live Status displays below the selected Phantom camera's Preview Panel.

2. Via Live Control Panel:

a. Open the Live Control Panel by clicking on the Live tab.

b. Click on the Capture button.

c. Click the OK button when the "Delete existing RAM cines and proceed to new recording?" warning message appears.

RESULT: Camera is now in Live Mode as indicated by the Live Status displays below the selected Phantom camera's Preview Panel.

3. Go back and follow directions for Capturing Video via the Phantom Camera Control Application and Playback Operations.

IMPORTANT OPERATIONAL NOTES

1. Do NOT disconnect the Ethernet cable from the Phantom Control Unit or the Phantom camera while in operation. If the Ethernet connection is disrupted, the camera may lock up. Be sure to close the Phantom Camera Control application completely on the control unit before disconnecting the Ethernet cable.
2. ALL images will be LOST in camera if power to the camera is removed.
3. Insure the lens is clean before recording.

RELATED PROCEDURE

Changing IP Address on the Phantom Control Unit

1. Click the Start button in the Windows Taskbar, then
2. Open the Control Panel.
3. Double-click on the Network Connections option.
4. In the Network Connections window:
   a. Right-mouse click on appropriate Ethernet Connection, then
   b. Select the Properties command.
5. In the connection's Properties dialogue window:
   a. Highlight the Internet Protocol (TCP/IP) option, then
   b. Click the Properties button.
6. In the Internet Protocol (TCP/IP) Properties dialogue window:
   a. Enable the “Use Follow IP Address automatically" radial button.
   b. Enter IP Address : 100.100.100.1
      Subnet: 255.255.0.0
   c. Click OK.

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7. Close all open windows and return to Pre-Installation Check.

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3.2 Phantom Miro Touch-Sensitive LCD Cameras

This Quick Start Guide aims to provide 6 easy steps to get started using your Phantom Miro cameras using the "Touch-Sensitive" LCD Screens.

For full details on the procedures described in the guides, please refer to the Phantom Miro Control via "Touch-Sensitive" LCD Screens section.

STEP-BY-STEP PROCEDURES

Power Up the Phantom Camera

1. Connect Capture Cable to Phantom camera.
2. If using an external trigger, connect it to Trigger BNC, (Red), of the Capture Cable.
3. Attach the Power Supply connector to the Phantom Miro camera, then
4. Apply AC Power to the Power Supply Adapter.
5. Hold the Power-On/Trigger button in, on the Phantom Miro camera for approximately 2 seconds, then
6. Release the Power-On Trigger button.

NOTE

The start-up process takes approximately 15-seconds to complete. Once completed the camera will be placed into the LIVE PRE, (Live Preview), Mode.

Prepare the Camera to Record a Cine File

1. From the LIVE PRE Display Screen:
   a. Set the Resolution:
      1) Press directly on the Resolution field to select the field.
      2) Pressing directly on the value a second time increases the value.
      3) Pressing approximately 1/3 the screen height above the value to decrease the value.
      4) Repeat until the desired value is displayed.

NOTE

The Resolution of a Phantom Miro 1 is fixed at 640x480, and con not be changed.

   b. Set the Sample Rate:
      1) Press directly on the Sample Rate field to select the field.
      2) Pressing directly on the value a second time increases the value.
      3) Pressing approximately 1/3 the screen height above the value to decrease the value.
      4) Repeat until the desired value is displayed.
   c. Set the Exposure Time:

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1) Press directly on the Exposure field to select the field.

2) Pressing directly on the value a second time increases the value.

3) Pressing approximately 1/3 the screen height above the value to decrease the value.

4) Repeat until the desired value is displayed.

2. Perform a Black Reference Calibration:

a. Cover the lens with the lens cap.

b. If not already in the Power Off Display Screen, gently tap on the Phantom logo to access the Power Off Display Screen.

c. From the Power Off Display:

1) Press the BREF (Black Reference) selector.

NOTE

The Black Reference adjustment process should be performed whenever your camera settings are changed.

3. Perform a White Balance Adjustment (Color Cameras Only):

a. Point the camera at a white object.

b. Align the object to center of the frame.

NOTE

Ensure that the area to calculate the White Balance adjustment on is not saturated and is completely over a white reference.

c. If not already in the Power Off Display Screen, gently tap on the Phantom logo to access the Power Off Display Screen.

d. In the Power Off Display Screen:

1) Gently press the WBAL (White Balance) selector.

2) Examine the display, if you need to perform a White Balance again, simply repeat the process until you are satisfied.

NOTE

The White Balance adjustment process should be performed whenever lighting conditions change.

3) Gently press on the Back selector.

Capture Video via the LCD

1. Click on the Record selector in the LIVE PRE Display Screen.

2. Trigger the Phantom Camera via the:

a. LIVE WTR Display Screen

1) Press the Trigger selector to supply a soft-trigger signal to the camera.

b. Power-On/Trigger Button

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1) Depress the Power On/Trigger button to apply a hard-trigger to the camera.

c. Capture Cable Trigger Input Connector

1) Provide a hard trigger to the camera by supplying:

a) Dry switch closure, or

b) A low TTL pulse signal.

Playback Operation

1. Gently press on the Play selector in the LIVE CST Display Screen.
2. Use the Playback controls to review recorded images:

Reverse; to double the reverse playback speed hold down for approximately 1 seconds.

Reverse 1 Image.

Forward 1 Image.

Forward; to double the forward playback speed hold down for approximately 1 seconds.

NOTE

To Pause the playback process, gently press slightly below the Memory Buffer Graphical Representation Bar at the top of the display screen.

3. Edit the record cine file:
   a. Gently press the Edit/Save selector.
   b. Locate the first frame the cine file is to begin with.
      1) Press a little below the Memory Buffer Graphical Representation Bar, then
      2) Hold down on the screen, and
      3) Scrub in the direction you wish the cine file to go, (right - backwards, left - forwards).
   c. Set the Mark In Point:
      1) Press the Set In Selector.
   d. Locate the last frame the cine file is to end with:
      1) Press a little below the Memory Buffer Graphical Representation Bar, then
      2) Hold down on the screen, and
      3) Scrub in the direction you wish the cine file to go, (right - backwards, left - forwards).
   e. Set the Mark Out Point:
      1) Press the Set Out Selector.

NOTE

To scrub through the cine file:

a. Press slightly below the Memory Buffer Graphical Representation Bar, then

b. Gently hold down on the screen, and

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c. Scrub in the direction you wish the cine file to go, (right - backwards, left - forwards).

To reset the Mark In and Mark Out Points, press the Reset selector.

4. Press the Back selector, and Playback the preferred, (edited), file.
5. Save the edited file to the installed Type1 CompactFlash® Card.
   a. Press the Save selector in the Edit/Save Display Screen.
   b. Ensure that the Size of the Cine to be saved does not exceed the amount of available Free Space on the Compact Flash card.
      a) Press the Save Selector in the Save Display Screen if there is enough Free Space on the CompactFlash Card.
      b) If there is not enough room on the CompactFlash Card to save the cine file:
         1) Replace the CompactFlash Card with one that has enough space available.
         2) Press the Save Selector, or
         3) Connect the camera to the Phantom Control Unit and use the Phantom Camera Control application to save the cine file to an external storage device.
6. Ensure the cine file you just downloaded, has been stored in the Type1 Compact Flash Card, and is not corrupted before deleting the cine file from the camera.

NOTE

A CompactFlash Card Reader connected to the Phantom Control Unit is required for this portion of the process.

   a. Carefully remove the CompactFlash Card from the camera.
   b. Insert the CompactFlash Card into the Flash Card Reader.
   c. Attach the CompactFlash Card Reader to the Phantom Control Unit.
   d. From the Desktop of the Phantom Control Unit:
      1) Click Start>My Computer.
      2) Double-click on the CompactFlash Drive.
      3) Double-click on the cine file just saved, then
      4) Review the saved cine file in the Phantom Camera Control application.
         a) If the cine file was not saved, or corrupted:
            i. Carefully, re-install the CompactFlash Card into the camera, then
            ii. Retry saving the edited cine file again.

CAUTION

Ensure that the CompactFlash Card is oriented properly before seating it in the camera. DO NOT FORCE THE CARD INTO THE CAMERA. Failure to comply with this instruction may result in a serious camera failure requiring it to be returned to Vision Research for service.

         b) If the cine file was saved properly:
            i. Carefully, re-install the CompactFlash Card into the camera, then
            ii. Continue with Quick Start Process.

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Get Ready to Record Again

After ensuring the cine file you just downloaded, has been saved to the Type1 Compact Flash Card, and was not corrupted:

1. Delete the recorded cine file from the camera's DRAM.
   a. Click the Back selector in the Save Display Screen.
   b. Click the Back selector in the Edit/Save Display Screen.
   c. Click the Delete selector in the PL CST Display Screen, then
   d. Click the Yes selector in the Delete Existing Recording Display Screen.
2. Go back and follow directions for Capturing Video via LCD and Playback Operations until all required cine files have been recorded.

Power Down the Camera

1. From the Power Off Display:
   a. Press Power Off selector.
2. In the Power Off Confirmation Screen:
   a. Press the Yes selector to power off the camera, or
   b. Press the No selector continue.

CAUTION

Any cine file stored in the camera's memory must be deleted prior to powering down the camera. Failure to comply with this procedure will cause the camera to run on battery power until the battery discharges completely.

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3.3 Phantom 65 or HD-Series Cameras via On-Camera Controls

This Quick Start Guide aims to provide x easy steps to get started using your Phantom 65 or HD Series cameras using the On-Camera Control buttons.

For full details on the procedures described in the guides please refer to the Phantom 65 or Phantom HD Control via "On-Camera" Control Buttons section.

STEP-BY-STEP PROCEDURES

At the time of this writing this Quick Start Guide is still under development.

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Part

4 Phantom Camera Control Application - Help

Beta Software Version 1.0.686
Updated: 3/18/2010

The Phantom Camera Control Application provides you with complete creative control over time. You can shift the frame rate a little and move a scene to a slightly future viewpoint. Alternatively, shift the sample rate a lot and move a scene to some long passing moment in time. You will enjoy the ability of having seamless control of the duration, speed and time of every element of the shot.

With its two main components of the system, the Phantom imager with advanced CMOS technology, and the Phantom Camera Control Application , they form a system that provides high speed, high resolution, image capture in a digital cine format, with analytical cine playback, and communications across multiple digital and analog protocols.

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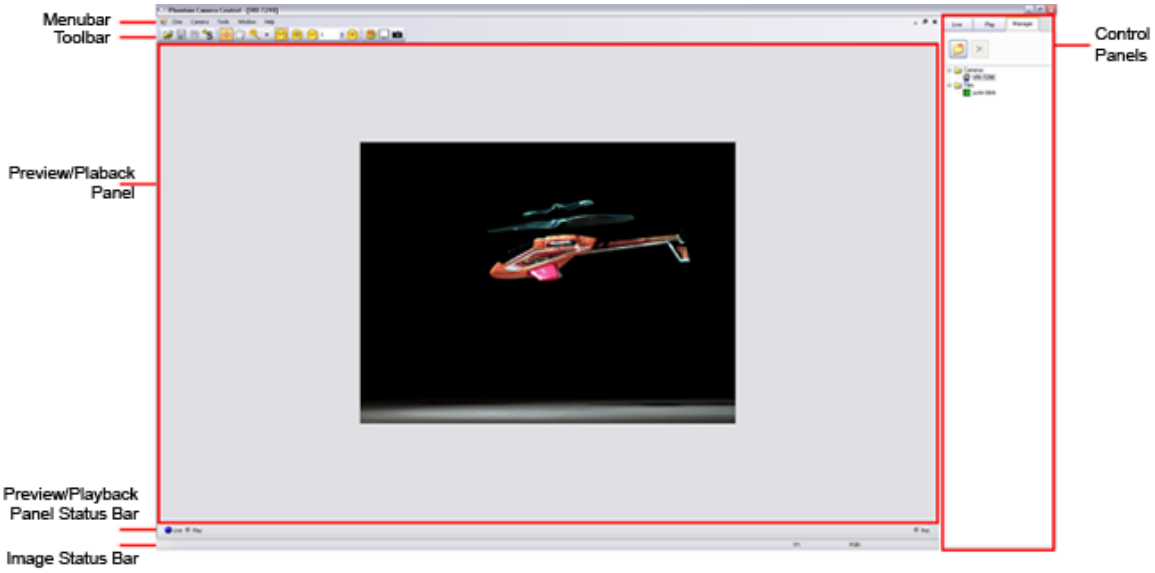
4.1 The User Interface

The Phantom Camera Control Application user-friendly Windows based software application, supplied with each camera, provides an intuitive graphical user interface.



The software is built around a multi-layered work area that includes the following work areas:

Menubar

The Menubar provides access to pull-down menus that provide various functions. The availability of these functions is dependent upon the active control panel.

Toolbar

The Toolbar provides quick access to the most frequently used functions. Just position the mouse over a tool and wait for a second to display a brief text describing what it is for.

Preview/Playback Panel

Preview Panels displays exactly what the Phantom cameras are imaging, while the Playback Panels display recorded cine files for review and/or editing.

The type of panel that can be displayed varies based on the active control panel. From the:

Manager Control Panel

Both Preview and Playback Panels can be displayed when the Manager Control Panel is active. In single camera environments the Preview Panel of the connected camera can be displayed, and/or the user can open cine files stored in camera memory, and/or previously recorded cine files each in their own independent Playback Panel. Each of these panels can be viewed separately or simultaneously by selecting the Window>Tile command from the Menubar.

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Live Control Panel

Live Control Panel only permits Preview Panels to be opened providing live camera images.

Play Control Panel

Play Control Panel only permits Playback Panels to be opened, (one for each cine file to be reviewed or edited).

Manger Control Panel

The Manager Control Panel is used to manage up to 63 Phantom cameras for use, and manage previously saved cine files.

Live Control Panel

The Live Control panel is used to:

- Access a specific Phantom camera for use in multi-camera environments.
- Define the camera's capture parameters.
- Place the camera into the Capture, (recording), State.
- Stop the capture process.
- Delete all image data recorded into the selected camera's DRAM.
- Send a soft-trigger to the camera.

It also provides the Preview Panel described above.

Play Control Panel

The Play Control Panel is used to view, edit, and/or save a cine file that:

- It has been previous saved.
- It has been stored in the camera's DRAM.

It also provides information about the cine file being reviewed.

Status Bars

There are two status bars located just below the preview/playback panels. The top bar display's status information about the selected camera's operational state, while the lower bar displays the XY coordinates and the RGB, (Red, Green, Blue), values of a specific pixel.

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4.1.1 Menubar

The Menubar provides access to pull-down menus that provide various functions. The availability of these functions is dependent upon the active control panel.

Menubar Example

The Menubar contains the following options:

Cine

The Cine pull-down menu provides the following commands:

Open File

The 'Open File' command is used to open a previously saved cine file. The opened file will be added under the Files group in the Manager Control Panel, and will be displayed in the Playback Panel when the Manager or Play Control Panels are selected.

Save to File

The 'Save to File' command is used to save image data recorded in a camera's DRAM to a user specified location, (for example, your system's hard drive, a networked drive or to some peripheral drive such as a floppy drive, Zip drive, or tape drive).

The command will only be available when the:

- Play Control Panel has been selected, and the camera has been triggered, or a previously saved cine file has been opened and selected for playback.
- Manager Control Panel has been selected and a cine file for a specific camera has been selected, or a specific previously saved file has been selected.

Save All RAM to File

The 'Save All RAM to File' command is used to save all cine image data recorded in a camera's DRAM to a user specified location, (for example, your system's hard drive, a networked drive or to some peripheral drive such as a floppy drive, Zip drive, or tape drive). This feature is extremely useful when the MultiCine feature has been implemented in the camera as it will save all memory segments, with image data stored into it, to the specified location.

The command will only be available when the:

- The camera has a cine file stored in its' DRAM.
- Play Control Panel has been selected.
- Manager Control Panel has been selected and a cine file for a specific camera has been selected.

The Phantom Camera Control application will save the cine files from each of the memory segments, of the selected camera, with a user specified file name along with an appended extension (Cine#) for each of the cine files.

Save All Flash to File

The 'Save All Flash to File' command is used to save all cine files stored in the non-volatile Flash memory or an attached Phantom CineMag, of the selected camera. It will save the files with a user specified file name along with an appended extension,

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(camera_name_FlashCine#.ext), to a user specified location, (for example, your system's hard drive, a networked drive or to some peripheral drive such as a floppy drive, Zip drive, or tape drive).

Save to Flash

Non-volatile Flash Memory is an optionally installed solid-state flash storage module located in a Phantom camera. This feature helps protect data loss caused by a power interruption to the camera after recording one or more cine files.

The 'Save to Flash' command is used to save image data recorded in a camera's DRAM to the Phantom camera's optionally installed integrated non-volatile Flash memory.

The command will only be available when the:

- The Phantom camera has the integrated non-volatile Flash memory installed.
- The camera has a cine file stored in its' DRAM.
- Play Control Panel has been selected, or the
- Manager Control Panel has been selected and a cine file for a specific camera has been selected.

Select&Save Cines to File

The 'Select&Save Cines to File' feature allows the end-user to specify specific cine files, or MultiCine memory segments, from one or more attached Phantom camera to save.

NOTE

The Select&Save Cines to File command will only be enabled if any of the connected cameras has at least one cine recorded in DRAM or in Flash/CineMag.

Camera

The Camera pull-down menu provides the following commands:

Add Simulated Camera

The 'Add Simulated Camera' command is used to simulate a Phantom camera model. This feature can be very useful to determine recording times and the number of images that can be recorded for various camera models prior to purchasing a camera or memory upgrades. You can simulate a camera with or without using an existing .STG file resulted from a camera with the same serial.

For a brief explanation of a .STG, (Serial Tag Number), file, see: Functional Descriptions>Phantom STG, (Serial Tag Number), File.

Copy Parameters to..

The 'Copy Parameters to..' command is used to copy all the active Live Control Panel settings to:

All Cines in this camera

The 'All cines in this camera' command will only be available when the selected Phantom camera has been configured to use the MultiCine feature.

This command instructs the camera to change the settings, in all memory partitions, to match the settings currently displayed in the Live Control Panel. When the command is selected, the "Copy?" dialogue window is displayed asking you to confirm that you wish to "Copy cine Preview, or cine n, (where n is the memory segment number), parameters over all other cines in this cam?" before it takes any action.

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If a cine, (a memory partition), has a cine file stored in it an informational window will be display indicating that the "Cine n params have not been overwritten! Stored cine!" however, all free cine segment settings will be changed.

All Cameras

The 'All cameras command' is only available in a multi-Phantom camera environment.

This command instructs set all the Phantom cameras, in the camera network, to change their Live Control Panel settings to match the setting of the active camera.

NOTE

The Copy Parameters to.. command is not available with simulated cameras.

Load Settings

The 'Load Settings' command is used to load previously saved camera parameters. This feature is extremely useful to the camera quickly, especially when regression tests need to be performed. It could also be used to open a camera .STG file to either reset the camera back to its factory default calibration settings or change the operational mode of the camera into the camera's Flash memory.

Save Settings

The 'Save Settings' command is used to save the present camera settings to a setup, (. STP), file for recall at a later date. It can also be used to save the CSR, (Current Session Reference), calibrations to a .STG, (Serial Tag Number), file that can also be recalled at a later date.

For a brief explanation of CSR, (Current Session Reference), see: Functional Descriptions>Black Reference/Current Session Reference Adjustments.

All setup files saved to the hard drive can be recalled from the drive by using the Load Settings command.

Delete All RAM Cines

The 'Delete All RAM Cines' command is used to delete cine file stored in a selected camera's DRAM. This command is extremely useful when the selected camera has been set to use the MultiCine feature.

Erase Flash Memory

The 'Erase Flash Memory' command is used to purge all cine files stored in a Phantom camera's optionally installed integrated non-volatile Flash memory module or Phantom CineMag.

Properties

The 'Properties' command, when selected, opens the Properties window displaying the Camera Name, Serial Number, IP Address, Hardware Code, of the connected camera. It also displays the Firmware, FPGA, and Kernel loaded in the camera. The 'Properties' window will also display the size of DRAM image memory and non-volatile Flash memory integrated in the selected Phantom camera.

The 'Properties' dialogue window also allows the end-user to add a secondary IP address to the selected Phantom camera.

NOTE

Adding a secondary IP address to the camera does not remove the factory assigned IP address.

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Tools

The Tools pull-down menu provides the following commands:

Image Tools

The 'Tools' command, when selected, opens the Image Tools dialogue window used to:

- Display an image Histogram.
- Perform image processing adjustments.
- Apply various image processing effects.

Firmware control (Nucleus)

The 'Firmware control (Nucleus)' command, when selected, initiates the Phantom Nucleus application that allows the end user to, in one simple operation, load firmware FPGA, (Field Programmable Gate Array), Flash FPGA, Cinemag, and Kernel firmware. It allows the end user to load firmware files into the selected visible camera, or in a camera which responds to a ping command, by introducing its IP address and a value for camera version.

Using this Firmware Control command provides for the upload of the firmware files to your camera. After loading the firmware files, the program tries to reconnect the camera. It may be necessary to power the camera off then on again for Phantom to reconnect to the camera.

NOTE

You should never do a firmware upgrade when running on battery power.

Prior to performing a firmware upgrade to a Phantom v9.0, v7.2, v7.1, v7.0, v5.1, v4.3, orv4.2 Camera, make sure the camera is connected to AC power. Vision Research highly recommends that you contact our Technical Support staff before performing an upgrade to any of these cameras.

The upgrade process should never be used to load an earlier version firmware that is already loaded into the camera, and must not ever be used with an IEEE1394 camera model.

If the application cannot automatically identify the camera, you will have to specify the IP address and the camera version.

Enable Logging

When enabled the system will generate a PhCon.log file used by Vision Research Engineers to determine if there are any errors with the Phantom Camera Control Application code.

Preferences

The 'Preferences' command , when selected, opens the Preferences dialogue window used to define the:

- Phantom Camera Control Application Interface options.
- Phantom Camera Control Application Imaging options.
- Exposure, EDR (Extreme Dynamic Range™), and PostTrigger Units.
- Snapshot settings.

Camera Visibility

The 'Camera Visibility' options allow the end-user to specify:

See all available cameras

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When selected the Manager Control Panel will display,under the Cameras Group, a list of all cameras presently connected or previously connected.

See only previous camera list

When selected the Camera Visibility button is activated, in the Manage Control Panel. The Camera Visibility button is used to open the Camera Visibility box and add or remove cameras in the list of visible cameras.

NOTE

If no Phantom cameras are present, based on the Camera Visibility selection, the system will display an available simulated Phantom v7 camera.

Window

The Window pull-down menu is used to manage the Preview/Playback Panel. The pull-down menu provides the following commands:

Tile

The 'Tile' command instructs the Phantom Camera Control application to display side-by-side all selected Phantom cameras live, preview images, or all selected RAM/Flash/CineMag cines and open cine files in Play panel, or in Manager panel. The Tile display format is extremely useful when making comparisons of cine files, or when judging the effectiveness of various image-processing techniques. The images being displayed may be cropped on the screen: drag the scroll buttons, located on the right side and bottom of the panels, to display more of the image.

Auto Tile

The 'Auto Tile' command instructs the Phantom Camera Control application to automatically display any newly opened Preview/Playback Panel side-by-side (tiled), with any previously opened display panel.

Select File List

The 'Select File List' command, located below Auto Tile command, allows the end-user to select which of the opened display panels is to be the active panel.

Help

The Help pull-down menu presently has two commands:

PCC Help

When PCC Help is selected this Help File opens.

Camera Hardware

to be added...

Camera Control Panels

The Camera Control Panels option, when selected, opens the Phantom Cine Control Panel Help File.

Remote Control

The Remote Control option, when selected, opens the Phantom Camera Control via Remote Control Unit Help File.

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About

When About is select, the About window displays the Phantom Camera Control version information.

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4.1.2 Toolbar

The Toolbar icons provide various functions. The availability of these functional icons is dependent upon the active control panel.

Toolbar Example

The Toolbar contains the following icons:

Open File Icon

The Open File icon is used to open a previously saved cine file. The open file will be added under Files in the Manager Control Panel, and will be displayed in the Playback Panel when the Manager or Play Control Panel is selected.

Save to File Icon

The Save to File icon is used to save image data recorded in a camera's' DRAM to a user specified location, (for example, your system's hard drive, a networked drive or to some peripheral drive such as a floppy drive, Zip drive, or tape drive).

The icon will only be available when the:

- Play Control Panel has been selected, and the camera has been triggered, or a previously saved cine file has been opened and selected for playback.
- Manager Control Panel has been selected and a cine file for a specific camera has been selected, or a specific previously saved file has been selected.

Save All Cines From This Camera... Icon

The Save All RAM to File icon is used to save all cine image data recorded in a camera's DRAM to a user specified location, (for example, your system's hard drive, a networked drive or to some peripheral drive such as a floppy drive, Zip drive, or tape drive). This feature is extremely useful when the MultiCine feature has been implemented in the camera as it will save all memory segments, with image data stored into it, to the specified location.

The command will only be available when the:

- Play Control Panel has been selected, and the camera has been triggered and selected for playback.
- Manager Control Panel has been selected and a cine file for a specific camera has been selected.

The Phantom Camera Control application will save the cine files from each of the memory segments, of the selected camera, with a user specified file name along with an appended extension (Cine#) for each of the cine files.

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CrossHair Icon

The CrossHair icon, when selected changes the mouse pointer to a CrossHair mouse pointer. The size of the CrossHair mouse pointer is 32x32 pixels.

Pan Icon

The Pan icon allows the end-user to pan the Preview/Playback Panel, quickly, on an image that is larger the display area. By selecting and placing this icon over the displayed image, then holding down the left-mouse key while moving the mouse, the displayed image moves in the direction the icon is being moved.

Zoom Actual Size Icon

The Zoom Actual Size icon, when selected, resizes the images being displayed in the Preview/ Playback Panel to their original size.

Zoom Fit Icon

The Zoom Fit icon is used to resize the images being displayed to fit within the Preview/ Playback Panel. The images will either be digitally zoomed in or out depending on the size of the Preview/Playback Panel.

Zoom Selection List Icon

The Zoom Selection List icon allows the end-user to select the amount of digital zoom, in or out, will be applied to the images being displayed in the Preview/Playback Panel. Images can be digitally zoomed up to 16x or reduced to 1/16 the original image size.

Image Tools Icon

The Image Tools icon, when selected, opens the Image Tools dialogue window used to:

- Display an image Histogram.
- Perform image processing adjustments.
- Apply various image processing effects.

Video Out Icon

The Video Out icon when select initiates the Phantom Video Player application. The Phantom Video Player provides the end-user with the ability to control any Phantom Ethernet camera

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attached to an external monitor. This feature will be extremely effective with the higher resolution cameras since most computer monitors do not refresh the screen images quickly enough to produce a smooth visual display.

By default the Phantom Video Player window is set to display a live image on the monitor. The user can quickly perform an edit of the recorded a cine file by easily selecting the range of images to be played back.

Once edited the user will be able to playback and save the recorded cine file from the camera's memory, using the video playback buttons along with adjusting the speed of the playback.

For details on how to utilize the Phantom Video Play see: Phantom Video Player Help File.

NOTE

This Video Output Control feature is only accessible with Ethernet model cameras, the player has not been implemented for the IEEE 1394 camera models, or the Image^3.

SnapShot Icon

The SnapShot icon, when selected, opens the Snapshot Application, defined via the Tools>Preferences dialogue window, with the image that was being displayed in the Preview/ Playback Panel when the SnapShot icon was selected.

Refer to the Snapshot Application Manufactures Help File for details on using the specified application.

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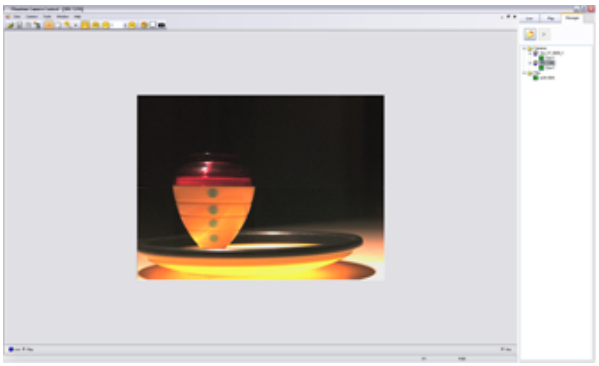
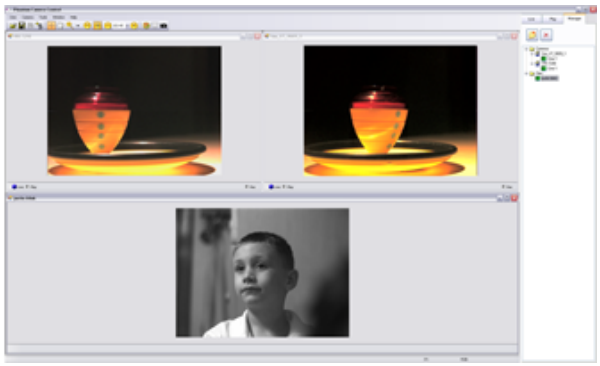
4.1.3 Preview/Playback Panel

Preview Panels displays exactly what the Phantom cameras are imaging, while the Playback Panels display recorded cine files for review and/or editing.



Single Panel



Multiple Panels - Tiled

The type of panel that will be displayed varies based on the active control panel. From the:

Manager Control Panel

Both Preview and Playback Panels can be displayed when the Manager Control Panel is active. In single camera environments the Preview Panel of the connected camera can be displayed, and/or the user can open cine files stored in camera memory, and/or previously recorded cine files each in their own independent Playback Panel. Each of these panels can be viewed separately or simultaneously by selecting the Window>Tile command from the Menubar.

Live Control Panel

Live Control Panel permits Preview Panels to be opened providing live camera images, and perform automatic White Balance adjustments.

Play Control Panel

Play Control Panel permits Playback Panels to be opened, (one for each recorded cine in camera's DRAM or open cine file to be reviewed or edited), and perform automatic White Balance adjustments.

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4.1.4 Status Bar

A unique Status Bar is displayed as part of the Phantom Camera Control application, and all Preview/ and Playback Panels. The type of information displayed in the status bar varies based on the panel type, as follows:

Phantom Camera Control Status Bar Information

The Phantom Camera Control Status Bar displays status information for the active Preview/ Playback Panel, including:

XY:

XY: indicates the XY: coordinate of a pixel when the cursor is placed over the active Preview/Playback/Manager Control Panel. The XY coordinates represents the pixel located in the center of the cross-hair cursor. The XY coordinates will be displayed in the following format: <x-coordinate value> x <y-coordinate value>. For example: 426 x 324.

RGB:

RGB: indicates the RGB, (Red, Green, Blue), values of a pixel when the cursor is placed over the active Preview/Playback/Manager Control Panel. These RGB values represent the color value of the pixel located in the center of the cross-hair cursor. The RGB: values will be displayed in the following format: <red value>, <green value>, <blue value>. For example: 12, 823, 1525.

The range of values is dependent upon the pixel image bit depth, as follows:

- 8-bit pixel image depth has 255 values.
- 10-bit pixel image depth has 1024 values.
- 12-bit pixel image depth has 4096 values.
- 14-bit pixel image depth has 16384 values.

Preview/Playback Panel Status Bar Information

The type of status information displayed varies based on operational state of the selected Phantom camera, as follows:

Live Status Indicator

When active, (Blue), the Live status indicator informs the end-user that the selected Phantom camera is:

- Capturing Preview images only, (The selected camera is not in the process of recording image data). Essentially, what this means is, the camera is in an idle state, formally referred to as "Waiting for Pre-trigger". In this operational state, the camera has a lower power consumption requirement.
- In the recording operational state.

Rec Status Indicator

When active, (Red), the Rec status indicator informs the end-user that the selected Phantom camera is in the Capture or Record operational state, recording image data, and displaying the images in the Preview Panel, while storing the image data into the camera's DRAM. The recording process will stop when a trigger signal is detected by the camera and all the post trigger frames have been recorded.

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Play Status Indicator

The Play Status Indicator will be active, (Green), when a Playback Panel of a cine file stored in the selected camera has been selected.

4.1.5 The Control Panels

The Phantom Camera Control application graphical user interface incorporates three uniquely functional control panels, including the:

Manager Control Panel

The Manager Control Panel is used to manage:

- Up to 63 Phantom cameras for use.
- Previously saved cine files.
- Delete all image data recorded into a selected Phantom camera's DRAM.
- Group cameras for control of multiple Phantom cameras.
- Group cine file for simultaneous playback.

Live Control Panel

The Live Control panel is used to:

- Access a specific Phantom camera, or group of cameras, for use in multi-camera environments.
- Define camera capture parameters.
- Place the camera, or camera group, into the Capture, (recording), State.
- Stop the capture process.
- Send a soft-trigger to the camera, or group of cameras.
- View live preview images.

Play Control Panel

The Play Control panel is used to review, edit, and/or save a recorded cine file.

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4.1.5.1 Manager Control Panel Components

The Manager Control Panel is used to manage up to 63 Phantom cameras for use, and manage previously saved cine files.

NOTE

The Manager Control Panel will display, in the camera list, all previously connected to cameras regardless is they are connected to the controller unit or not. Cameras are retained until they have been removed from the list by the end-user. Previously recorded cine files will also be retained in the list until they are removed via the end-user, or they have been moved from their original location.

The Manager Control Panel consists of the following components:

New Group Button

The New Group button instructs the software to add a sub-group, (folder), under the highlighted group in the tree structure. The new group can contain multiple Phantom cameras, (under the Camera Group), that can be accessed in the Live Control Panel to control multiple Phantom cameras simultaneously, or it can contain multiple cine files, (under the Cine Group), that can be accesses in the and Play Control Panels to review multiple cine files simultaneously.

NOTE

Phantom cameras and cine file cannot be associated with multiple groups. However, any Phantom camera or cine file under the sub-group tree can be controlled or reviewed respectively. For example, Files Sub-Group1 contains; cine1, cine2, and cine3, along with another sub-group File Sub-Group2. Files Sub-Group2 contains cine4, cine5, and cine6, etc. When Files Sub-Group2 is selected in the Play Control Panel; cine4, cine5, and cine6 can be reviewed simultaneously, if Files Sub-Group1 is selected all six cine files can be reviewed simultaneously.

Camera Visibility Button

The Camera Visibility button is used to Add or remove a camera in the list of Visible cameras. The Camera Visibility button is activated when in Tools > Preferences the set option for Camera Visibility is “See only previous camera list”. Use this button to open the Camera Visibility box and add or remove cameras in the list of visible cameras.

Remove From Tree Button

The Remove From Tree button is used to remove a specific camera, cine file or sub-group, along with any objects under the sub-group tree.

Cameras Group

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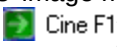
The Camera group contains a list of all Phantom cameras that are presently connected to the Phantom Camera Control application, (indicated by the camera present icon), or have been connected to the Phantom Camera Control application in the past but are not connected presently, (indicated by the camera not present icon).

Phantom cameras that have a cine file stored in its' image memory buffer, (indicated by

), and/or non-volatile Flash memory, (indicated by 

) will have cine sub-items under the camera tree.

If no Phantom cameras are detected when the Phantom Camera Control application is opened, the software will place a simulated Phantom v7 camera in the Cameras' group tree.

For details on how to utilize the Camera Group see: Step-by-Step Procedures... Camera Access and Step-by-Step Procedures... Opening a Cine File from Camera Memory.

Files Group

The Files Group contains a list of available saved cine files that have been opened by the Phantom Camera Control application at one time for review.

For details on how to utilize the Files Group see: Step-by-Step Procedures... Opening a Cine File Under the File Group.

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4.1.5.2 Live Control Panel Components

The Live Control Panel is used to define the recording parameters for the selected Phantom camera, and consist of the following components:

Group Lock Button

The Group Lock button is used to control and apply setting made to one camera associated to a specific sub-group to all the cameras in the same sub-group automatically.

Camera: (Pull-Down Selection List)

The Phantom Camera Control application is capable of supporting up to 63 Phantom cameras. This selection list window displays any user-defined Cameras Group sub-group, and the names of the Phantom cameras presently connected to the Phantom Control Unit. Any changes made in the Live Control Panel will be applied only to the Phantom camera or group of cameras specified in this field, unless the Copy Parameters to..>All cameras command has been selected in the Camera menu options.

Camera Settings Selector

The Camera Settings fields are used to display, reset, or synchronize the time stamp clock information, set the bit depth of the active pixels, repartition or segment the DRAM of the camera, perform CSR, (Current Session Reference), or Black Reference calibration adjustments.

The following is a brief description of the setup parameters associated with the Camera Settings:

Current Time

The Current Time field displays the date and time, an image will be time stamped with, in the following format: hh:mm:ss Weekday Month Day Year.

Set Time.. Button

The Set button, when selected, opens the Set Camera Time dialogue window that incorporates the following:

Computer Time

The fields associated with the Computer Time displays the date, time, and time zone of the attached Phantom Control Unit. The active camera, or group of cameras synchronize the time stamp to this control unit's local time setting, unless an IRIG-B time source is being used as the clock reference.

The Computer Time is displayed in the following format: Field 1: Weekday , Month Day, Year; Field 2: hh:mm:ss; Field 3: Time Zone, (The time difference from UTC - Universal Time Code, formally GMT - Greenwich Means Time).

Current Camera Time

The fields associated with the Current Camera Time display the date, time, and time zone of the selected Phantom Camera. The Current Camera Time and the Computer Time should be synchronized when there is no IRIG-B clock source attached to the camera. If an IRIG-B clock source is attached the Current Camera Time, should be synchronized to the IRIG-B clock and will display the IRIG-B reference time.

The Current Camera Time is displayed in the following formats: Field 1: Weekday , Month Day, Year; Field 2: hh:mm:ss; Field 3: Time Zone (The time difference from

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UTC - Universal Time Code, formally GMT - Greenwich Means Time).

New Camera Time

New Camera Time allows the end-user to change the Current Camera Time when the Set or Update and Set button are selected.

DayofYear

This informational field indicates the day number from the start of the year, January 1.

Set Button

The Set Button allows the end-user to edit the Current Cameras date and time fields manually , and write these values to update the camera's internal time stamp clock, when selected.

NOTE

If the camera is connected to an IRIG-B clock source the Current Camera Time will immediately revert back to the time stamp supplied by the IRIG-B signal when the Set button is selected.

Update and Set Button

The Update and Set button, when selected, will automatically synchronize and set the camera's internal clock, (Current Camera Time), to the local date and time of the Windows operating system, (Computer Time), of the attached Phantom Control Unit.

NOTE

If the camera is connected to an IRIG-B clock source the Current Camera Time will immediately revert back to the time stamp supplied by the IRIG-B signal when the Set button is selected.

Close Button

The close button closes the Set Camera Time dialogue window.

Local Radial Button

The attached Phantom Control Unit's date and time settings are used as the time reference when the Local radial button is selected.

utc (GMT) Radial Button

When selected the date and time reference will be adjusted to Universal Time Clock, formally referred to as Greenwich Mean Time (GMT). The adjustment will be the time difference from the date and time settings of the attached Phantom Control Unit to the universal time clock. The Universal Time option will append the nomenclature utc to the Camera Settings>Time information.

CSR Button

The CSR Button initiates the CSR, (Current Session Reference), calibration adjustment process when selected.

For a brief explanation of CSR, (Current Session Reference), see: Functional Descriptions>Black Reference/Current Session Reference Adjustments.

Black Reference Button (Available on certain camera models only)

The Black Reference Button initiates the Black Reference calibration adjustment process when selected.

For a brief explanation of Black Reference), see: Functional Descriptions>Black Reference/

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Current Session Reference Adjustments.

NOTE

Neither a CSR, (Current Session Reference), nor Black Reference calibration adjustment be performed if the EDR, (Extreme Dynamic Range), or Auto Exposure features have been enabled.

Bit Depth (Pull-down Selection List Window)

A variety of the Phantom camera sensors have the ability to record and save 8-, 10-, 12-, or 14-bit values, (gray scale image levels), that are transferred to the Phantom Control Unit as either 16- or 8-bit words. By default Phantom cameras display 8-bit, (256 gray scale level), images. The 8-bits used to display these images are the most significant, or high order, bits of 14-bit values.

This Bit Depth feature makes it possible to increase contrast and see images with less light simply by selecting which region of the total dynamic range of the image is to be displayed on-screen. The display outputs 8-bits even though the image may have up to 14-bits. This is because each of the 8-bits of data selected, by the end-user, is split into 16-bits where the high order bits are used with well lit subjects and the low order bits for dimly lit subjects.

NOTE

8-bit to 14-bit images need exactly the same amount of light to saturate the sensor, what differs is the fineness in the number of gray scale levels recorded.

The Bit Depth pull-down selection list allows the end-user to specify the Bit Depth for the user specified Phantom camera.

Partitions (Pull-down Selection List Window)

Partitions allow the end-user to specify the number of memory segments, or partitions, the selected camera's DRAM memory will be evenly divided into.

NOTE

Each cine file, from a MultiCine recording, can have its own acquisition parameters. The MultiCine feature is not available with the Phantom v4.1, v4.2, v5.0, v6.0, or v6.1 camera models.

Lens Control

The Lens Control option allows the end-user to control an attached lens when used with the Automatic Lens Control Mount remotely . The end user can adjust/set the:

- Aperture (f-stop), and/or
- Focus

Cine Settings Selector

The Cine Settings fields are used to define the cine recording profile. The following is a brief description of the setup parameters associated with the Cine Settings:

Cine

The Cine field activates when the MultiCine feature is defined. By default the system places

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the camera into Preview mode, allowing the user to view a live image in the Preview Panel. Once the camera is placed into the capture, (recording), mode, the Cine field will automatically change from Preview to the Cine Number. Initially, the cine number will be 1 because the system automatically writes image data into the first unused memory segment, unless otherwise instructed by the end-user.

Selecting a cine number, from the list, will place the camera into the capture, (recording), mode.

Selecting Preview will place the camera into the "Preview, Waiting for pre-trigger..." mode. It is in this mode that you can specify setup parameters that can be applied to all memory segment profiles when the Copy Parameters to>All Cines in this cam command is selected via the Camera pull-down menu. When Preview is selected the camera is instructed to send a live image to the control unit and/or attached monitor, and set the camera to the idle state.

Selecting the Copy Parameters to>All Cameras command, via the Camera pull-down menu, changes the Live Control Panel settings for all cines to the values currently displayed. This option deletes any recorded cine files in the camera. This system will, however, verify this process by displaying a Warning message for every recorded cine prior to deleting the image data.

Lock All Button

By selecting the Lock All button all cine partitions will synchronize to any changes made to the Resolution, Sample Rate, Exposure, EDR exposure, and Post Trigger, of any cine partition. The changes will be applied to all cine partitions in the selected camera or sub-group of cameras.

NOTE

This feature is only applicable when a Phantom camera is in MultiCine mode.

Resolution

The Resolution setting allows the user to change the dimensions of the images. The Resolution is the width to the height ratio of the image to be recorded. Each type of camera has a specific maximum resolution. Changing the Resolution settings to match the dimensions of the subject of interest allows the user the option of recording at higher sample rates, or longer recording times at the same sample rate.

Phantom cameras can be mounted in any position allowing great flexibility in matching the shape of the subject of interest.

To define the desired Resolution, click the down-arrow to the right of the Resolution field to view a list of predefined aspect ratios. If the end-user wishes to use a resolution not displayed within the list simply enter the desired Resolution, and hit the enter key, the system will select the closest, allowable, Resolution for the camera's sensor.

Using the CAR (Continuous Adjustable Resolution) feature, provides for resolution adjustments between the minimum and maximum drop-down list values as follows:

- Phantom 65 in 4096 x 8 pixel increments.
- Phantom HD Gold, HD in 2048 x 8 pixel increments.
- Phantom v710, v640, v310, v210, and v12 Series in 128 x 8 pixel increments.
- Phantom v10 and v9.1 in 96 x 8 pixel increments.
- Phantom v9.0 in 48 x 8 pixel increments.
- Phantom v7.3 in 32 x 8 pixel increments
- Phantom v7.2, v7.1, v7.0, v6.2e, v4.3, and v4.2 in 16 x 8 pixel increments.

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- Phantom v5.1 in 64 x 4 pixel increments.
- Phantom v6.0, v5.0, v4.1, and v4.0 in 8 x 8 pixel increments.
- Phantom Miro eX4, Miro 4, Miro eX3, Miro 3, Miro Airborne, Miro eX2, Miro 2 in 32 x 8 pixel increments.

Sample Rate

The Sample Rate specifies the rate at which images are to be recorded. The s rate is depended upon the defined Resolution, (width-to-height ratio), of the images being captured.

For actual Sample Rates refer to: Functional Descriptions>Frame Rate Tables.

Exposure Time

The default setting is nominally, the reciprocal of the sample rate less 20 microseconds of overhead. Click the down-arrow to display a drop down list box and select one of the preset exposure times in the pull down list box. If the desired exposure time is not listed an exposure time may be entered. The Phantom Camera Control application allows the end-user to enter exposure times in one-microsecond increments between the minimum and maximum exposure time in the drop down list.

EDR

The EDR, (Extreme Dynamic Range), exposure time feature is very useful when the subject contains very bright areas as well as darker areas and both must be exposed properly throughout the cine file. The EDR function permits the end-user to expose for darker areas in the subject via the Sample Rate and Exposure time settings and then set a separate and independent pixel level EDR exposure for all the portions of the image that might become saturated, (over exposed). The EDR feature is automatically enabled when any value, other than zero, is entered in the EDR Exposure field.

NOTE

EDR Exposure times should be set at approximately 1/2 of the Exposure time as a starting point. By setting the EDR Exposure to 1/2 of the Exposure time the brightest pixels in the images will be exposed for one stop less than the darker pixels.

The EDR feature cannot be used in conjunction with the Auto Exposure feature and should not be enabled while performing a CSR, (Current Session Reference), or Black Reference calibration adjustment.

Low Light Button

Using the Low-Light feature automatically sets the camera exposure to a pre-defined level. This exposure level is based on the camera's resolution and sample rate settings.

Trigger Position

The Post Trigger parameter sets the number of images or frames to be saved after a trigger has been detected. Setting the number of post trigger images also determines the reciprocal number of pre-trigger images saved.

Post Trigger Slider

Sets the number of images or frames to be saved after a trigger has been detected and automatically changes the value in the Post Trigger entry box. Moving the slider to the left increases the number of post trigger frames, while sliding it to the right will reduce the number of post trigger frames.

Post Trigger

The Post Trigger parameter sets the number of images or frames to be saved after a trigger

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has been detected, and automatically readjusts the position of the Post Trigger slider.

The end-user can set the Post Trigger value by:

1. Click on the down-arrow, to the right of the entry window, and select one of the preset values from the pull down list box, or
2. Enter a post trigger value, between the minimum and maximum preset values displayed in the pull down list box, and depress the enter key.

Frames:

This field indicates how many images or frames will be recorded within the camera's recording Duration time. This field will change based on the amount of memory in the camera, and how the resolution, and sample rate are set, and will change accordingly.

Duration:

This field indicates the total length of recording time. The recording duration is based on the amount of memory in the camera, along with the resolution and sample rate settings. This field will change based on these variables. This field should be referred to when determining the required number of Post Trigger frames to set.

Advanced Settings Selector

The Advance Settings fields are used to define End of recording actions, frame synchronization clock parameters, Real Time Out parameters, camera clock, temperature thresholds, and signal acquisition parameters, and more.

The following is a brief description of the setup parameters associated with the Advanced Settings:

Cine Advanced

Exposure in PIV Mode

This feature has been designed for use in PIV (Particle Imaging Velocimetry) applications. When enabled the Phantom v-series cameras are instructed to reduce the Frame Straddle Time to an interval of 1.5µs. For a Phantom v710, v640, v310, v210 or v12 the Frame Straddle time will be reduced to 300 nano-seconds

Trigger Delay

This feature allows end-users to add a delay between the trigger command,(via Phantom Camera Control application, or hardware), and the actual recording into the camera's image buffer DRAM. After the trigger signal is detected, the Phantom camera will loop-record into DRAM the specified number of frames. The effect of this is a delay, because the frames that will actually be kept into the camera's image buffer will be the images recorded after this delay.

NOTE

Using Trigger Delay will automatically set Post Trigger position to the maximum.

CineMag

Direct recording to CineMag Enable Box

By default Phantom cameras will write the image data into its' DRAM image buffer prior to writing it into the non-volatile Flash memory of a Phantom CineMag. When enabled, (checked), the Direct recording to CineMag feature (called Run/Stop mode too) instructs the Phantom camera to write the image data directly into the non-volatile Flash memory of the mounted Phantom CineMag. The camera memory will retain in this case only the

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last images, no more than a number equal to “Frames” value. This option is used also to record in CineMag cines with more images than “Frames” value.

For a brief description of the operational modes defined by the Direct Recording to a Phantom CineMag feature, see: Functional Descriptions>Phantom CineMag Operational Modes.

Start/End of recording actions

The End of recording action parameters, listed below, instruct the selected Phantom camera to perform various tasks immediately after a cine file has been recorded into the camera's DRAM, including:

Auto Black Reference

When a cine file starts recording, a CSR slot is allocated to the cine file and a black reference operation is performed with the results being saved into the slot. During the lifetime of the recording in DRAM, the CSR slot is kept and all images from the cine file are corrected using the black reference data within. CSR slots are freed when a stored cine file is specifically deleted or reused when the cine file itself is reused.

For cameras having an attached Phantom CineMag operating in the Live recording mode, the recording into the Phantom CineMag is delayed until the black reference operation has completed. All frames saved to the Phantom CineMag will be corrected with the obtained CSR (Current Session Reference).

NOTE

This automatic CSR, (Current Session Reference), mode is available for Phantom cameras equipped with the Automatic Shutter feature only.

Auto save to CineMag/built-in Flash Enable Box

When enabled, (checked), the:

- Images captured in the selected camera's DRAM will automatically be stored into the camera’s non-volatile memory, or
- The camera will be instructed to automatically save the image data into its mounted Phantom CineMag after the end of recording.

Auto save to HDD/CF card Enable Box

This feature has been designed to save the captured images:

- In the camera's DRAM, to a specified location on a network HDD, defined in the "filename:" entry box, or
- In a Miro3 or Miro4 cameras' DRAM to the Type 1 Compact Flash card.

Auto play Video Out Enable Box

When enabled, (checked), the cine file will automatically be displayed on an attached video monitor for review.

repeat

Repeat allows the end-user to specify the number of times the recorded cine file will play back on an attached monitor. Entering a zero, (0), instructs the cine file to loop indefinitely when the Playback to video feature is enabled.

FullCine Enable Box

When enabled, (checked), the option instructs the software to playback every image in the recorded cine file. It will also disable the First and Count image range fields.

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First

Firsts defines the image number of the first cine image to be used to create the cine file to be saved or viewed.

Count

Count defines the total number of cine images used to create the cine file to be saved or viewed, starting from the First image defined above.

External Sync

The External Sync parameters, listed below, are used to define the frame sync clock source, specify the master camera supplying the frame sync clock source to other Phantom cameras, and define how much to delay the recording of image data from the frame sync clock pulse. The External Sync parameters include the:

Sync Imaging (Selection List Window)

This entry field instructs the selected camera to utilize one of the following three frame sync clock sources:

Internal

This mode instructs the camera to utilize its' internal crystal oscillator to drive the camera's sample rate.

External

This mode should be selected when an externally supplied frame sync clock pulse is supplied to drive the camera's sample rate. The external input must be a TTL pulse, with a frequency up to the maximum sample rate. (Example: 1000Hz @ 512 x 512 resolution, 2000Hz @ 256 x 512 resolution.) The TTL input pulse must be connected to the BNC, (Bayonet Neill-Concelman), connector marked Sync on the Capture breakout-cable/box.

NOTE

When External sync imaging is selected the Sample Rate option will be disabled.

Lock to IRIG

This mode should be selected when an IRIG-B signal is supplied through the marked IRIG Input BNC, (Bayonet Neill-Concelman), connector on the Capture breakout-cable/box.

NOTE

When Lock to IRIG sync imaging is selected the Sample Rate option will be disabled.

Refer to the Functional Descriptions>Frame Rate Tables for a list of frame rates a Phantom camera will lock to.

Master camera serial (0=none)

The Master camera serial parameter specifies the serial number of Phantom camera providing the frame sync clock source. If set to zero, (0), no external sync will be applied.

This field MUST be defined when synchronizing multiple Phantom cameras using one Phantom camera as the primary clock source.

Frame Delay µs

The Frame Delay parameter field can be used in one of two ways:

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- If the camera is being clocked via another camera the delay MUST be set to a minimum of 1µs greater than that defined in the clock source camera. or
- If a delay is required between the clock source pulse and the frame capture to provide a phase shift in the timing.

This field MUST be defined when synchronizing multiple Phantom cameras using one Phantom camera as the primary clock source.

Real Time Output

When enabled, checked, an image data will stream to an Image[3].

Enable Box

When enabled, (checked), image data will stream from the selected camera to an attached Image[3].

Temperature

The Temperature informational fields indicate the operating temperatures of the selected camera and its' sensor.

Cam:

This informational field displays the operating temperature of the camera.

NOTE

If the temperature of the Cam:, (camera), exceeds the camera's factory set threshold setting the camera's cooling system will work harder to reduce the camera's operating temperature.

Sensor:

This informational field displays the operating temperature of the sensor.

NOTE

If the Sensors temperature rises above the sensor's factory set threshold setting, the sensor's thermal expansion diodes will reduce the temperature of the sensor. If the sensor temperature dips below the (sensor) factory set threshold setting, the sensor's thermal expansion diodes will increase the temperature of the sensor.

Signals Button

The Signals button, when selected, opens the Analog and Binary Signal Acquisition dialogue window used to define the parameters necessary for the Phantom Camera Control application to process the signal information.

NOTE

This feature is not supported on the Phantom 65, HD, or Miro Series cameras.

Trigger

Rising/Falling Edge

When selected defines whether the leading edge or trailing edge of a TTL supplied input trigger signal is to be used to trigger the camera. To select the leading or falling edge click the Rising Edge or Falling Edge radio button respectively.

Filter Time (ms)

Filter Time instructs the Phantom camera to ignore a trigger signal if it is detected before the specified Filter Time parameter. It also specifies the length of time the

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trigger signal must be held in for it to be a valid trigger signal.

NOTE

The Trigger options are not available with the Phantom v4.1, v5.0, or v6.0 cameras.

pre-trigger pin is:

Pre-Trigger Pin Is specifies whether a TTL supplied input signal is to be used to toggle Memory Gate or as a pre-trigger input signal.

NOTE

The MemGate options are not available with Phantom v4.1, v5.0, or v6.0 cameras.

Ready signal ends at:

Ready signal ends at instructs the connected-to camera to toggle off its READY signal either the moment a Trigger signal has been detected by the camera or when the allocated memory, in the selected camera, has completed capturing all the images to be recorded.

Miro/Strobe pin is:

The option allows the user to specify the signal type to be activated on the Auxiliary pin of the capture connector.

NOTE

This option will only be available when connected to a Miro 3, Miro 3.1, Miro eX4, or Miro 4 camera.

Start In

The Start In command allows the end-user to specify the default operational state a camera should be placed into when the user powers up the camera. The possible states include:

Idle

When selected this radio button instructs the camera to start in the Preview Waiting for pre-trigger... mode. This means the end-user will have to click the Capture button, in the Live Control Panel, to place the camera into the Preview + Recording… waiting for trigger mode.

Capture

When selected this radio button instructs the camera to start in the Preview + Recording… waiting for trigger mode.

NOTE

The Start in options are not available with the Phantom v4.1, v5.0, or v6.0 camera models.

Auto Exposure Selector

AutoExposure Enable Box

When enabled, (checked), the Auto Exposure feature will be enabled. The Auto Exposure feature is extremely useful when conditions adversely effect setting the camera's exposure

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to a fixed variable, such as capturing outdoors where clouds may change the light conditions. The system will adjust the Exposure using the information from the defined area. The defined pixel area should be the focus of interest or the area of interest, in other words, the subject matter.

NOTE

The Auto Exposure feature cannot be used in conjunction with the EDR, (Extreme Dynamic Range), feature and should not be enabled while performing a CSR, (Current Session Reference), or Black Reference calibration adjustment.

For a brief explanation of Black Reference, see: Functional Descriptions>Black Reference/ Current Session Reference Adjustments.

Level

Level defines the average gray scale level for the specified area, to be realized by the automatic exposure system. For example, for an 8-bit pixel image depth a mid gray: 128.

Rectangle

Rectangle defines the region of interest where the auto-exposure measures the average pixel level. The larger the area the slower the process becomes.

The Rectangle, or region of interest to be auto exposed, is defined by entering the following parameters:

Top

Specifies the y-coordinate of the top row of pixels.

Left

Specifies the x-coordinates of the left column pixels.

Right

Specifies the x-coordinates of the right column pixels.

Bottom

Specifies the y-coordinate of the bottom row of pixels.

Show On Image Enable Box

When enabled, (checked), a red box, indicating the region of interest where the auto-exposure measures the average pixel level, will be displayed over the area specified by the end-use in the Preview Panel, and will not be recorded with the image data.

Full Button

When enabled, (checked), instructs the software to auto expose the entire image area.

TECH TIP

A user-friendly technique as been incorporated into the Phantom Camera Control Software to define the Rectangle. Simply, identify the area of interest in the Live Preview Panel and place a box around the area of interest. This can be accomplished by placing the cursor just above the upper left hand corner of the area of interest, the hold down the left mouse key and drag the cursor just below the lower-right-hand corner of the area of interest, (the subject matter to be auto-exposed), and release the mouse key. The Rectangle parameters will automatically be changed to the pixel area selected.

Frame Rate Profile Selector

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This Frame Rate Profile feature allows the end-user to define up to 5 different frame rates that automatically change, at specified points, during the capturing process of post trigger frames. The first profile is the profile defined under Live Control Panel>Cine Settings Selector. The remaining four profiles will be applied to Post Trigger frames only.

NOTE

This Frame Rate Profile feature is not available with all Phantom cameras, and the actual frame rate changes will only be applied to Post Trigger frames.

Intervals Selection List

The Intervals Selection List defines the number of profiles to be used during the capture process. Changing the Intervals value generates a uniform distribution of the profile partitions, (in image count).

Image#/Time Selection List

This selection list is used to specify the desired variable used to define the profile(s). The selection list includes the following options:

Image#

The Image# specifies the first frame or image number the defined profile will change.

Time(s)

Specifies the time from trigger.

Image%

Specifies the image number percentage from post trigger frames.

Time%

Specifies the time percentage from post trigger duration.

NOTE

If the header variable is changed for the first column the remaining values will be updated according to selected variable. Small changes can occur, because of the rounding process, when switching from, then back to the Image# option.

Rate

The Rate entry fields define the sample rate or frame rate the images will be recorded at. The rates will be updated in order to be compatible with the exposure value set in Live Control Panel – Cine Settings.

PT Duration

This field indicates the total length of recording time. The recording duration is based on the amount of memory in the camera, along with the resolution and rate settings. This field will change based on these variables.

Rate Profile Graph

The Rate Profile Graph displays an active graphical representation of the defined profiles.

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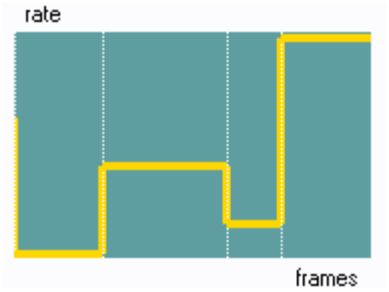

Frame Rate Profile Graph Example with 5 profiles defined

The yellow line indicates the defined frame rates for each of the profiles. The starting point of the line represents the Sample Rate set, and used by Profile 1, under Live Control Panel>Cine Settings Selector.

The white dotted lines represent the beginning of the specified Image or Time variables starting with Profile 2.

Image-Based Auto-Trigger Selector

WARNING:

The Image-Based Auto-Trigger feature should never be used in applications where missed or false triggers cannot be tolerated or where a false trigger could cause harm to people or property.

The hardware signaling available in some Image-Based Auto-Trigger modes should be used only to synchronize multiple Phantom cameras together and should never be used to trigger or control any other external device or event.

CONSEQUENCES RESULTING FROM SYSTEM FAILURE, FALSE TRIGGERING OR MISUSE OF THIS FEATURE ARE THE SOLE RESPONSIBILITY OF THE USER.

The feature allows the end-user to trigger the camera from the motion detected in the live image. The camera may also provide an external trigger signal based on the Image-Based Auto-Trigger to be used for synchronizing multiple Phantom cameras. The defined pixel area should be the area of the image changes are analyzed to auto-trigger the camera.

For a brief explanation of Image-Based Auto-Trigger, see: Functional Descriptions>Image-Based Auto-Trigger.

Image-Based Auto-Trigger Enable Box

When selected, (checked), the Image-Based Auto-Trigger feature will be enabled.

Only Output Signal Enable Box

When enabled, (checked), The image changes are analyzed, and when an auto-trigger condition has been detected, the auto-trigger signal will be pulled low. However, the camera will not trigger itself. An external device pulling the auto-trigger signal low will not trigger the camera either.

This option is useful when external control of the auto-trigger is desired, for instance, it is required that the auto-trigger feature is disabled for some known transient event. The auto-trigger signal from the camera will be routed through some external device and back into the trigger input of the camera.

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Sensitivity

The Sensitivity parameter defines the:

Threshold

The Threshold specifies the amount a pixel value must change in order to be counted as an active pixel for auto-trigger purposes. A value of 100 would require a change of approximately half of the full swing of the camera. A typical threshold setting would be 10.

Area %

The Area % specifies the percentage of the auto-trigger region that must be active in order for an auto-trigger event to be generated. A typical percentage value is 10.

Check Interval (ms)

The Check Interval parameter specifies the speed between updates the auto-trigger region is checked.

Area

Area defines the auto-trigger region, and is defined by entering the following parameters:

Top

Specifies the y-coordinate of the top row of pixels.

Left

Specifies the x-coordinates of the left column pixels.

Right

Specifies the x-coordinates of the right column pixels.

Bottom

Specifies the y-coordinate of the bottom row of pixels.

Show On Image Enable Box

When enabled, (checked), a yellow dotted box, indicating the auto-trigger region, where image changes are analyzed, will be displayed over the area specified by the end-use in the Preview Panel, and will not be recorded with the image data.

Full Button

When enabled, (checked), instructs the software to analyze the entire image area.

Continuous Recording Selector

Continuous Recording is a functionality to continuously record in camera RAM and auto-save stored cines. If the camera is in MultiCine mode the camera will record sequentially in cine slots.

When the RAM is full the needed cine RAM slot will only be deleted and captured if it was saved, otherwise there will be a wait until this action completes.

NOTE

Only one save at a time will be done from one camera.

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On every start and stop the current Continuous Recording settings will be serialized and saved in a XML file. These settings will be loaded at application startup and the Continuous Recording will auto-start accordingly to the last saved settings.

Active: check this box to start Continuous recording. The camera will get into: “Waiting for trigger” status. Uncheck it to stop Continuous recording.

Cine file paths & save parameters: this field should contain the path and file name necessary for saving recorded cines.

Auto Trigger: use this checkbox to auto trigger every cine immediately after capture.

Once Only: use this checkbox for single cine to capture and save only one cine, or for MultiCine to capture and save cines until the camera RAM is full.

Status: will show “Running/Not running” or “Waiting for file to be saved” status.

Save count: will count the files saved in the current session.

Capture Button

The Capture button puts the camera into the recording mode. When the Capture button is clicked, image data will be continuously recorded, in an endless loop, to an image storage area until the camera has received one of the three different types of trigger signals. When the Record button is clicked it will change to the Abort Recording button.

NOTE

In Run/Stop mode (Direct Recording to CineMag), Capture button will become Record button. When clicked Record button will change to the Stop Recording button.

Trigger Button

Selecting the Trigger button provides a “soft” trigger to the camera, when the camera is in Capture mode, that instructs the camera to stop capturing and recording images to the storage buffer. It is just one of five possible ways to trigger the Phantom cameras, the other four, with the camera in Capture mode, include:

- Press "Alt T" on the keyboard.
- Provide a dry switch closure to the BNC connector marked Trigger on the Capture breakout cable attached to the rear panel of the camera.
- Provide a low TTL pulse to the BNC connector marked Trigger on the Capture breakout cable attached to the rear panel of the camera.
- Provide a low TTL pulse to the BNC connector marked Trigger on the Breakout Box that attached to the rear panel of the camera.

After the camera gets triggered, the camera will continue to record a number of images equal to post trigger frames value set in Live Control Panel – Cine settings.

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4.1.5.3 Play Control Panel Components

The Play Control Panel is used to review, edit, and/or save recorded cine files, and consist of the following components:

Group Lock Button

The Group Lock button is used to instruct the Phantom Camera Control Application to simultaneously control all cameras' playback, associated with a specified sub-group.

Cine: (Pull-Down Selection List Window)

The Cine: field displays a list of the cine files, that the end-user can select to review, edit, and/or save. The list contains all the cine files listed under the:

- Cameras Group Tree which contains a list of connected Phantom cameras. A list of cines will also be displayed under any connected Phantom camera that has a cine stored in the DRAM of the camera or in the Flash/CineMag memory.
- Files Group Tree, which contains a list of all open and previously opened cine files.

Playback Buttons

Play Fast Rewind decrements images: the total number of cine frames /1000, no less than 10 frames, auto adjusting to cine size.

Play Fast Forward increments images: the total number of cine frames /1000, no less than 10 frames, auto adjusting to cine size.

Standard Play Rewind decrements 1 image at a time.

Standard Play Forward increments 1 image at a time.

Pause Playback stops or pauses the playback process.

Play Step Backward rewinds 1 image only.

Play Step Forward advances forward 1 image only.

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Jump Field

The Jump fields can be used to quick search through the cine file. Use the:

 # (Image) Entry Field

The image number entry field is used to enter an image number, in the cine file, to jump to.

R Button

The 'R' or rewind button is used to rewind the cine file. If the Limit to Range mode is:

- Selected, the cine file rewinds to the Mark-In point specified by the end-user during the edit cine process.
- Not selected, the cine file rewinds back to the first image of the full cine file.

Trig Button

The Trig, (trigger), button, when selected, instructs the software to jump to the recorded image when the trigger signal was detected by the camera, the T_0 frame, if available.

Cine Editor Bar

Many recorded cine files contain a lot of unnecessary information both before and after the actual motion of interest. The cine editor bar is used to edit unnecessary images from the beginning and the end of the recorded cine file prior to saving the cine file. Editing the cine file will create smaller files, reduced to save times, and make reviewing the cine file more interesting.

The blue portion of the line, in the cine editor bar, represents the edited cine file. The number displayed at the left end of the cine editor bar refers to the first image in the entire cine sequence. The number at the right end of the bar refers to the last image in the entire cine sequence. The number just above the editor bar, in the center of the bar, indicates the number of the image presently being displayed in the playback panel.

The numbers below the editor bar indicate the first and last image numbers of the edited cine file, respectively.

Zero represents the first image after the moment of trigger was detected by the camera regardless of what sample rate or resolution settings were set to in the Live Control Panel. Negative numbers represent pre-trigger frames and positive numbers represent post trigger frames.

Mark-In/Mark Out Buttons

The Mark-In [button, when selected, defines the new starting point of the selected cine file, while the Mark-Out] button defines the new end point of the selected cine file.

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Play Speed & Options Selector

The Play Speed selector incorporates the following:

Loop Options

The Loop Options are used to specify how the cine file is to be reviewed. The Loop Options, include:

Limit to Range

When selected, (checked), the Limit to Range option forces the playback controls to play only the images between the Mark-In and Mark-Out entry points specified by the end-user.

Repeat

When selected, (checked), repeat will allow the cine file to be played in an endless loop. If the Limit to Range command is also selected, (checked), the loop will be limited to the range specified by the end-user during the edit cine process.

Ping Pong

Ping Pong instructs the software to play the selected cine file forward and then backward repeatedly when enabled, (checked).

NOTE

The software allows for multiple Loop Options to be selected at the same time.

Play Each Image (Enable Box)

When enable, (check), the Play Each Image command instructs the Phantom Camera Control application to display every frame, (image), in the cine file, and restrict the playback rate.

fps (Frames Per Second Playback Speed) Entry/Slider

The fps, (frames per second), slider is used to adjust the speed of the cine playback. This adjustment only applies when the Standard Play Forward and Standard Play Rewind buttons have been selected. The fps entry field allows the end-user to specify a playback frame rate within the minimum/maximum range indicated on the fps slider.

Group Play Option

Sync to Frame # Enable Box

When the Sync to frame # option is enabled, checked, the cine files associated with a specific sub-group will synchronize their playback. The cine files will be synchronized to the image number specified in the Jump> # (Image) entry field.

Frame Info Selector

The Frame Info(rmation) selector, when selected, displays information about the image being displayed. The frame information includes following information about the image being displayed:

Time

This informational field indicates the absolute time and date the image was recorded, displayed in hh:mm:ss:ms:µs; Day Mon dd yyyy. A tag may be appended at the end of time displays, as follows:

E - Provided as an event marker.

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S - Designates that the time displayed was synchronized to an IRIG-B time source.

NOTE

If the camera had an IRIG-B input clock at the time of recording, the IRIG-B time base will be displayed. If an IRIG-B timing source was not connected at the time of recording the "S" tag will not be displayed.

Interval

The interval information, displayed in micro-seconds, indicates the image interval or the time between frames for the recorded cine file.

Exposure

The exposure information, displayed in micro-seconds, indicates the image exposure time for the image being displayed in the Playback Panel.

Elapse Time from:

This informational field indicates the elapsed time from:

Trigger

This field, displayed in micro-seconds, indicates the elapsed time from the trigger point to the image currently being displayed in the Playback Panel.

Image#

This field, displayed in micro-seconds, indicates the elapsed time from the specified image number in this box and the image currently being displayed.

Signals.. Button

The Phantom Miro3, Miro4, v5.1, v7 series, v9 series, v10, v12 series, v210, v310, v640, and v710 cameras all provide the ability to gather analog signal information, binary signal information, or both from one of two Data Translation Data Acquisition Unit models, (the DT-3010 or DT9802). The gathered signal information is translated and stored for each image and can be displayed with the captured images during playback.

For details on SAM-3 installation and use, see: Accessories, Peripherals, and Miscellaneous Features>SAM-3 (Signal Acquisition Module-3), Installations.

Cine Info Selector

To display the setup parameters for the active cine file click the Cine Info down-arrow. Below is a brief of descriptions of informational fields, including:

Source

Source indicates the camera name or file path of the active cine file.

Description

The Description field allows the end-user to add a description after the cine file has been recorded via the Play>Cine Info>Description entry field. If the description multiple lines, open the multi-line viewer by pressing the drop button at the right of Description label. The description will be saved to the file together with the images and all other cine info.

The Description could be any name, project number, test sequence number, etc. It could be any combination of letters, numbers, or spaces, up to a maximum of 4,096 characters.

Format

Format displays the file format of the recorded file.

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Saved Range

Saved Range indicates the first and last image number of the images contained within the edited cine file.

Recorded Range

Recorded Range indicates the first and last image number of all the images recorded.

Color

Color indicates if the cine was captured using a color sensor (Yes) or a monochrome sensor (No).

Signals

Signals indicate if any external analog or binary signal measurements have been tagged to the recorded images via the SAM-3 (Signal Acquisition Module-3) unit.

Image Time

Image Time indicates if the image timing information, for the active cine file, is available or not.

Image Exposure

Image Exposure indicates if the image exposure information, for the active cine file, is available or not.

Camera Version

Camera Version specifies the camera version code used to capture the cine file.

Serial

Serial specifies the serial number of the camera used to capture the cine file.

Resolution

Resolution displays the width x height of images saved in a file. The images may contain a border so the Resolution may be greater than Acq Resolution.

Acq Resolution

Displays the width x height of images saved in a file. The images may contain a border so the Resolution may be greater than Acq Resolution.

Post Trigger

Post Trigger indicates the number of Post Trigger frames captured during the recording process.

Bits per pixel

Bits per pixel displays the active pixel's bit depth of the recorded images.

Sample Rate (fps)

Sample Rate displays what the Sample Rate, or frame rate, was set to record at.

Real

Real indicates the actual frame rate the images were recorded at.

Period

Period indicates the time necessary to record each of the images.

Exposure (µs)

Exposure displays the Exposure setting at the time the images were recorded.

EDR (µs)

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EDR indicates the Extreme Dynamic Range exposure time setting at the time the images were recorded. 0.000 indicates the EDR was disabled.

Frame Delay (µs)

Frame Delay indicates the amount of time, the end-user specified, each image is delayed from the frame rate clock pulse.

Sync

Sync indicates the sample rate clock source.

AutoExp.

AutoExp. indicates whether or not the Auto Exposure feature was used during the recording process.

AutoExp. Level

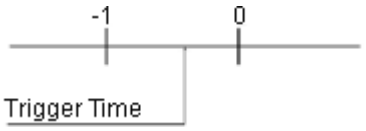
AutoExp. Level displays the Auto Exposure grayscale level defined by the end-user.

AutoExp. Rect

AutoExp. Rect displays the area, in pixels, the end-user specified to automatically adjust exposure for, when defining the Auto Exposure parameters.

Trigger Time

Trigger Time indicates the moment in time after the last pre-trigger image (-1) and before image 0.



Graphical representation of Trigger Time

Time Zone

Time Zone displays the time difference, in hours, from UTC, (Universal Time Code), formally referred to as GMT, (Greenwich Means Time).

Frame Rate Profile

Frame Rate Profile displays the Frame Rate Profile setting defined by the end-user during the cine files' capture process. If the Frame Rate Profile feature was not used this field will be left blank.

Save Cine.. Button

The Save Cine.. button, when selected, allows the end-user to save the selected cine file.

Save Cine.. Button Down-Arrow

When the Save Cine.. Button down-arrow is clicked, a pop-up selection window will be displayed allowing the end-user to select the save method desired, choices include:

Save Cine to File

The Save to File command is used to save image data recorded in a cameras' DRAM to a user specified location, (for example, your system's hard drive, a networked drive or to some peripheral drive such as a floppy drive, Zip drive, or tape drive).

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Save All RAM Cines to File

The Save All RAM to File command is used to save all cine image data recorded in a cameras' DRAM to a user specified location, (for example, your system's hard drive, a networked drive or to some peripheral drive such as a floppy drive, Zip drive, or tape drive). This feature is extremely useful when the MultiCine feature has been implemented in the camera as it will save all memory segments, with image data stored into it, to the specified location.

The Phantom Camera Control application will save the cine files from each of the memory segments, of the selected camera, with a user specified file name along with an appended extension (Cine#) for each of the cine files.

Save All Flash Cines to File

The Save All Flash to File command is used to save all cine files stored in the non-volatile Flash memory or an attached Phantom CineMag, of the selected camera. The files are saved with a user specified file name along with an appended extension, (camera_name_FlashCine#.ext), to a user specified location, (for example, your system's hard drive, a networked drive or to some peripheral drive such as a floppy drive, Zip drive, or tape drive).

Save RAM Cine to Flash

Non-volatile Flash Memory is an optionally installed solid-state flash storage module located in a Phantom camera. This feature helps protect data loss caused by a power interruption to the camera after recording one or more cine files.

The Save RAM Cine to Flash command is used to save image data recorded in a cameras' DRAM to the Phantom cameras' optionally installed integrated non-volatile Flash memory or in the CineMag.

Select&Save Cines to File

The Select&Save Cines to File feature allows the end-user to specify specific cines, or MultiCine memory segments, or cines stored in Flash/CineMag memory, from one or more attached Phantom cameras to save.

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4.2 Step-by-Step Procedures

This module describes the most common tasks you will use when working with your Phantom imaging system. It is designed as a "How-To" guide. Some of the procedures contain links to background information and other relevant subjects so you can just pick out the task you need to perform and begin.

The procedures in this module are intentionally kept as brief as possible. The focus is on how to use the menu bar commands, toolbar icons, and control panel options, to effectively use your Phantom imaging system.

4.2.1 Menubar Procedures

This section describes the Step-by-Step procedures can be performed using the various Menubar commands.

4.2.1.1 Cine Menu Procedures

This topic describes the Step-by-Step procedures that can be performed via the Cine pull-down menu.

4.2.1.1.1 Opening a Saved Cine File

STEP-BY-STEP PROCEDURE

To open a previously saved cine file:

1. Click on the Cine menu.
2. Select the Open File command.
3. When the Open Cine dialogue window opens:
   a. Navigate to the folder containing the cine file to be opened.
   b. Click on the cine file.
   c. Click the Open button.

RESULT: The Phantom Camera Control application will open the file in a Playback Panel, and add the cine file under the Files group, in the Manager Control Panel.

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4.2.1.1.2 Saving a Cine File

STEP-BY-STEP PROCEDURE

To save a captured cine file that has been recorded into the camera's memory buffer to your system's hard drive, a networked drive, or to some peripheral device:

1. From the Manager Control Panel, click on the cine file under the camera the cine file is stored in.
2. Click on the Cine menu in the menu bar.
3. Select the Save to File command.
4. When the Save Cine dialogue window opens:
   a. Navigate to the folder the cine file is to be saved to.
   b. Enter the filename of the cine file being saved in the File name: field, (the Phantom Camera Control application will automatically add the file extension).

      When saving the image data the end-user may need to use the Phantom File Naming Convention to specify the filename, for example, when saving the image data into an image stack. For a brief description of the various Phantom File Naming Conventions see: Functional Descriptions>Phantom File Naming Convention.
   c. Next to the Save as type: field, click the down-arrow and select the file format the cine file is to be saved as. Vision Research recommends that you save the cine file in the Cine RAW format.

      For a brief description of the various supported file formats, see: Functional Descriptions>Supported File Formats.

NOTE

The software allows the user select how much of the original cine will be saved to the cine file. Each image in the cine is numbered with the number displayed over the middle of the cine editor bar. Discarding images that contain non-useful information allows smaller files, maximizes the use of space on the hard drive, and creates a more interesting cine for viewing.

   d. If you have not edited the cine file using the Play Control Panel, you can edit the cine file by defining the Range of images to save:
      1) Enter the number of the First Image in the sequence you want to save.

         For example, the event begins at image number 72 in the cine file just recorded. By entering 72, all images recorded prior to image 72 will be discarded and will not be saved to this file.
      2) Enter the Image Count representing the total number of images to be saved in this cine file.

         For example, if the event that begins at the image number 72 and ends at image 171, enter 100 to discard all images after 171.
   e. Define the desired Save Options:
      1) Enable 16 bpp

         This feature will automatically be enabled, (checked), when the Bit Depth option is set to greater than 8-bits.

         For step-by-step procedure to set the Image Pixel Bit Depth see, Step-by-Step Procedures>Live Control Panel Procedures>Camera Settings>Define the Image Pixel Bit Depth.
      2) Split Quarters

         Presently disabled.

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3) Enable XML Header File

Place a check mark in the XML header file enable box to obtain, along with the cine or image files, an XML file describing the header information in XML language. You can open this XML file afterwards by double-clicking on the file name in Windows Explorer. The XML file can be a source of data for other applications.

4) Packed

Place a check mark in the Packed enable box to save a Packed RAW cine file from a Phantom CineMag.

For a description on the Packed file format see, Functional Descriptions>Supported File Formats.

5) Define the Advance Options

The Phantom Camera Control application allows the user to choose one of five color interpolation algorithms, (Best, Good, Medium, Fast, Fastest), that will be applied during the Save Cine.. process if the file format you selected is an interpolated one, that means other than raw.

a) Click the Advanced Options button, then

b) Select the desired Color Interpolation Algorithm.

NOTE

Once you selected a color interpolation algorithm and saved cine file in a non-raw, interpolated format you cannot apply another algorithm on the same saved cine by saving it again. In this case, the algorithm's options will be ignored.

6) Define desired Border Data

a) Click the Border Data button, then

b) Select the information you want to be added to the cine or to the image, specified in the Border data dialogue window:

i. Outside Image:

None - When selected the user may specify the Inside Image options.

Standard - When selected the user may define the following Common Options, and Optional Lines, that will be displayed just below the recorded cine, along with any Inside Image information fields specified.

Common Options:

Font Size - Specifies the font size the information will be displayed at.

Optional Lines:

Time Format - indicates the type of time stamp information to be displayed, including:

No time stamp - When selected no time stamp information will be displayed.

Absolute Time - When selected the date and time, down to the micro-second), the image was recorded is displayed.

From Trigger - When selected the time difference from when the image being displayed was recorded and the moment the camera was triggered will be displayed.

From Image 0 - When selected the time difference from when the image being displayed was recorded and the moment the first full image after a trigger was recorded will be displayed.

From First Image - When selected the time difference from when the image being displayed was recorded and the moment the first image of the cine was recorded

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will be displayed.

File Name - Displays the name of the file specified during the save process.

Image Number - Specifies the number of the image, starting from the first image in the cine.

Image Number From Zero - Specifies the number of the image, starting from the first image in the cine, after the trigger.

Camera Version - Indicates the camera model used to record the cine.

Acquired Resolution - Displays the width x height the cine was recorded at.

Rate - Indicates the Frame Rate setting at the time the images were recorded.

Exposure - Indicates the exposure setting of the image being displayed.

EDR Exposure - Indicates the Extreme Dynamic Range Exposure time setting at the time the images were recorded.

First and Last Image - Indicates the first and last image number of the images contained within the edited cine file.

Duration - Indicates the duration of the file.

Signals - Displays the values of all signals for each frame, captured via an attached Data Acquisition Unit.

Range Data - Displays range data information supplied by a tracking mount system to the camera via the Range Data connector.

Description - Indicates the information entered into the Description field in the Play Panel > Cine Info.

NOTE

All the optional lines, if selected, will also be displayed below the cine.

Military - When selected the user may define the following Outside Image fields, that will be displayed outside the recorded cine area, along with the Common Options, and Optional Lines, described above, along with any Inside Image information options selected.

Header - This editable field will be displayed just above the recorded cine.

Footer - This editable field will be displayed just below the recorded cine.

NOTE

All the optional lines, if selected, will also be displayed to the right of the cine.

Car Engine - When selected the user may define the following Outside Image fields, that will be displayed outside and below the recorded cine area, along with the Common Options, and Optional Lines, described above, along with any Inside Image information options selected.

Engine Speed

Spark Frame

Spark Crank Angle (deg)

Reset Angle (deg)

Cyl. Pressure (bar)

Text

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NOTE

All the optional lines, if selected, will be displayed above the cine.

ii. Inside Image:

Time Stamp - Where each image is tagged with the absolute date and time the image was recorded. Enabling this option will display the time stamp information when the file is played back.

From Trigger - When this option is selected the exact time the image was recorded from the time the trigger input was detected will be displayed.

Draw Signals - When available the user can define which analog signal sample information will be displayed in the corners of each image, up to four signals, (only available if the cine file was captured using an attached Data Acquisition Unit and SAM-3 for signal Acquisitions).

Samples per Stamp - Used to display the acquired selected signal samples on each image . The Samples per Stamp value is the number of samples to be displayed in the small corner windows representing the acquired signal. Its minimum value should be the value of "Samples per image" defined in Live Panel>Advanced Settings>Signals.

NOTE

The information displayed inside the image cannot be removed.

7) Specify the Lossy Compression Quality. (This option is only available when saving as a Cine JPEG, LEAD, LEAD JFIF, LEAD JTIF, JPEG, or JTIF file type.)

8) Define the Multihead Options... (Phantom v6 Series camera models only.)

a) Click the Multi-Head Options button:

When saving cine files from a Phantom v6 camera the system will, by default, save the images from all four imaging heads into a single cine file. To save a unique cine file for each of the Phantom v6 imaging heads:

i. Select the camera Head or Heads to save in the Multihead Options dialogue window, then

ii. Click the OK button.

5. Click the Save button to save the cine file.

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4.2.1.1.3 Saving All RAM to File, (MultiCine)

The Save All RAM to File command is used to save all cine image data recorded in a cameras' DRAM to a user specified location. This feature is extremely useful when the MultiCine feature has been implemented in the camera as it will save all memory segments, with image data stored into it, to the specified location.

The command will only be available when the:

- Camera has a cine file stored in its' DRAM.
- Play Control Panel has been selected.
- Manager Control Panel has been selected and a cine file for a specific camera has been selected.

STEP-BY-STEP PROCEDURE

1. Click on the Cine Menu option, then
2. Select the Save All Ram to File command.
3. When the Save Cine dialogue window opens:
   a. Navigate to the folder the cine file is to be saved to.
   b. Enter the filename of the cine file being saved in the File name field enter a root name to which there will be automatically appended an extension (Cine#) for each of the cines.
   c. Next to the Save as type: field, click the down-arrow and select the file format the cine file is to be saved as. Vision Research recommends that you save the cine file in the Cine RAW format.

      For a brief description of the various supported file formats, see: Functional Descriptions>Supported File Formats.

NOTE

The software allows the user select how much of the original cine will be saved to the cine file. Each image in the cine is numbered with the number displayed over the middle of the cine editor bar. Discarding images that contain non-useful information allows smaller files, maximizes the use of space on the hard drive, and creates a more interesting cine for viewing.

   d. Check “No Range (full cine always)” if you want to save full cines or set the First image and Image count values to set a save range. If you leave these values as they are, the save range will be the one defined by editing each cine (set Mark In and Mark Out in Play Panel).
   e. Define the desired Save Options:
      1) Enable 16 bpp

         This feature will automatically be enabled, (checked), when the Bit Depth option is set to greater than 8-bits.

         For step-by-step procedure to set the Image Pixel Bit Depth see, Step-by-Step Procedures>Live Control Panel Procedures>Camera Settings>Define the Image Pixel Bit Depth.

      2) Split Quarters

         Presently disabled.

      3) Enable XML Header File

         Place a check mark in the XML header file enable box to obtain, along with the cine or image

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files, an XML file describing the header information in XML language. You can open this XML file afterwards by double-clicking on the file name in Windows Explorer. The XML file can be a source of data for other applications.

4) Packed

Place a check mark in the Packed enable box to save a Packed RAW cine file from a Phantom CineMag.

For a description on the Packed file format see, Functional Descriptions>Supported File Formats.

5) Define the Advance Options

The Phantom Camera Control application allows the user to choose one of five color interpolation algorithms, (Best, Good, Medium, Fast, Fastest), that will be applied during the Save Cine.. process if the file format you selected is an interpolated one, that means other than raw.

a) Click the Advanced Options button, then

b) Select the desired Color Interpolation Algorithm.

NOTE

Once you selected a color interpolation algorithm and saved cine file in a non-raw, interpolated format you cannot apply another algorithm on the same saved cine by saving it again. In this case, the algorithm's options will be ignored.

6) Define desired Border Data

a) Click the Border Data button, then

b) Select the information you want to be added to the cine or to the image, specified in the Border data dialogue window:

i. Outside Image:

None - When selected the user may specify the Inside Image options.

Standard - When selected the user may define the following Common Options, and Optional Lines, that will be displayed just below the recorded cine, along with any Inside Image information fields specified:

Common Options:

Font Size - Specifies the font size the information will be displayed at.

Optional Lines:

Time Format - indicates the type of time stamp information to be displayed, including:

No time stamp - When selected no time stamp information will be displayed.

Absolute Time - When selected the date and time, down to the micro-second), the image was recorded is displayed.

From Trigger - When selected the time difference from when the image being displayed was recorded and the moment the camera was triggered will be displayed.

From Image 0 - When selected the time difference from when the image being displayed was recorded and the moment the first full image after a trigger was recorded will be displayed.

From First Image - When selected the time difference from when the image being displayed was recorded and the moment the first image of the cine was recorded will be displayed.

File Name - Displays the name of the file specified during the save process.

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Image Number - Specifies the number of the image, starting with the first image in the cine.

Image Number From Zero - Specifies the number of the image, starting from the first image in the cine, after the trigger.

Camera Version - Indicates the camera model used to record the cine.

Acquired Resolution - Displays the width x height the cine was recorded at.

Rate - Indicates the Frame Rate setting at the time the images were recorded.

Exposure - Indicates the exposure setting for the image being displayed.

EDR Exposure - Indicates the Extreme Dynamic Range Exposure time setting at the time the images were recorded.

First and Last Image - Indicates the first and last image number of the images contained within the edited cine file.

Duration - Indicates the duration of the file.

Signals - Displays the values of all signals for each frame, captured via an attached Data Acquisition Unit.

Range Data - Displays range data information supplied by a tracking mount system to the camera via the Range Data connector.

Description - Indicates the information entered into the Description field in the Play Panel > Cine Info.

NOTE

All the optional lines, if selected, will also be displayed below the cine.

Military - When selected the user may define the following Outside Image fields, that will be displayed outside the recorded cine area, along with the Common Options, and Optional Lines, described above, and any Inside Image information options selected.

Header - This editable field will be displayed just above the recorded cine.

Footer - This editable field will be displayed just below the recorded cine.

NOTE

All the optional lines, if selected, will also be displayed to the right of the cine.

Car Engine

When selected the user may define the following Outside Image fields, that will be displayed outside and below the recorded cine area, along with the Common Options, and Optional Lines, described above, and any Inside Image information options selected.

Engine Speed

Spark Frame

Spark Crank Angle (deg)

Reset Angle (deg)

Cyl. Pressure (bar)

Text

NOTE

All the optional lines, if selected, will be displayed above the cine.

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ii. Inside Image:

Time Stamp

Where each image is tagged with the absolute date and time the image was recorded. Enabling this option will display the time stamp information when the file is played back.

From Trigger

When this option is selected the exact time the image was recorded from the time the trigger input was detected will be displayed.

Draw Signals

When available the user can define which analog signal sample information will be displayed in the corners of each image, up to four signals, (only available if the cine file was captured using an attached Data Acquisition Unit and SAM-3 for signal Acquisitions).

Samples per Stamp

Used to display the acquired selected signal samples on each image . The Samples per Stamp value is the number of samples to be displayed in the small corner windows representing the acquired signal. Its minimum value should be the value of "Samples per image" defined in Live Panel>Advanced Settings>Signals.

NOTE

The information displayed inside the image cannot be removed.

7) Specify the Lossy Compression Quality. (This option is only available when saving as a Cine JPEG, LEAD, LEAD JFIF, LEAD JTIF, JPEG, or JTIF file type.)

8) Define the Multihead Options... (Phantom v6 Series camera models only.)

a) Click the Multi-Head Options button.

When saving cine files from a Phantom v6 camera the system will, by default, save the images from all four imaging heads into a single cine file. To save a unique cine file for each of the Phantom v6 imaging heads:

i. Select the camera Head or Heads to save in the Multihead Options dialogue window, then

ii. Click the OK button.

4. Click the Save button to save the cine file.

RESULT: The Preview Panel displays a Saving Cine.. message , and the Preview Panel Status Bar displays a Saving.. progress indicator.

The cine files for each of the memory segments being saved, from the selected camera, will be saved with the user specified file name along with an appended extension (Cine#) for each of the cine files. For example: The user specified name in this example is <MultiCine>. The software saved the cameras' four memory segment cine files as follows:

multicine_Cam_Miro 4_Cine_1.cine

multicine_Cam_Miro 4_Cine_2.cine

multicine_Cam_Miro 4_Cine_3.cine

multicine_Cam_Miro 4_Cine_4.cine

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4.2.1.1.4 Saving All Flash to File, (Flash/CineMag)

The Save All Flash to File command is used to save all cine files stored in the non-volatile Flash memory or an attached Phantom CineMag, of the selected camera. The files will be saved with a user specified file name along with an appended extension, (camera_name_FlashCine#.ext), to a user specified location, (for example, your system's hard drive, a networked drive or to some peripheral drive such as a floppy drive, Zip drive, or tape drive).

STEP-BY-STEP PROCEDURE

1. Click on the Cine Menu option, then
2. Select the Save All Flash to File command.
3. When the Save Cine dialogue window opens:
   a. Navigate to the folder the cine file is to be saved to.
   b. Enter the filename of the cine file being saved in the File name field enter a root name to which there will be automatically appended an extension (for example, _Cam_Miro 4_FlashCine#) for each of the Flash/CineMag cine.

      When saving the image data the end-user may need to use the Phantom File Naming Convention to specify the filename, for example, when saving the image data into an image stack. For a brief description of the various Phantom File Naming Conventions see: Functional Descriptions>Phantom File Naming Convention.
   c. Next to the Save as type: field, click the down-arrow and select the file format the cine file is to be saved as. Vision Research recommends that you save the cine file in the Cine RAW format.

      For a brief description of the various supported file formats, see: Functional Descriptions>Supported File Formats.

NOTE

The software allows the user select how much of the original cine will be saved to the cine file. Each image in the cine is numbered with the number displayed over the middle of the cine editor bar. Discarding images that contain non-useful information allows smaller files, maximizes the use of space on the hard drive, and creates a more interesting cine for viewing.

   d. Check “No Range (full cine always)” if you want to save full cines or set the First image and Image count values to set a save range. If you leave these values as they are, the save range will be the one defined by editing each cine (set Mark In and Mark Out in Play Panel).
   e. Define the desired Save Options:
      1) Enable 16 bpp

         This feature will automatically be enabled, (checked), when the Bit Depth option is set to greater than 8-bits.

         For step-by-step procedure to set the Image Pixel Bit Depth see, Step-by-Step Procedures>Live Control Panel Procedures>Camera Settings>Define the Image Pixel Bit Depth.

      2) Split Quarters

         Presently disabled.

      3) Enable XML Header File

         Place a check mark in the XML header file enable box to obtain, along with the cine or image files, an XML file describing the header information in XML language. You can open this XML file afterwards by double-clicking on the file name in Windows Explorer. The XML file

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can be a source of data for other applications.

4) Packed

Place a check mark in the Packed enable box to save a Packed RAW cine file from a Phantom CineMag.

For a description on the Packed file format see, Functional Descriptions>Supported File Formats.

5) Define the Advance Options

The Phantom Camera Control application allows the user to choose one of five color interpolation algorithms, (Best, Good, Medium, Fast, Fastest), that will be will be applied during the Save Cine.. process if the file format you selected is an interpolated one, that means other than raw.

a) Click the Advanced Options button, then

b) Select the desired Color Interpolation Algorithm.

NOTE

Once you selected a color interpolation algorithm and saved cine file in a non-raw, interpolated format you cannot apply another algorithm on the same saved cine by saving it again. In this case, the algorithm's options will be ignored.

6) Define desired Border Data

a) Click the Border Data button, then

b) Select the information you want to be added to the cine or to the image, specified in the Border data dialogue window:

i. Outside Image:

None - When selected the user may specify the Inside Image options.

Standard - When selected the user may define the following Common Options, and Optional Lines, that will be displayed just below the recorded cine, along with any Inside Image information fields specified:

Common Options:

Font Size - Specifies the font size the information will be displayed at.

Optional Lines:

Time Format - indicates the type of time stamp information to be displayed, including:

No time stamp - When selected no time stamp information will be displayed.

Absolute Time - When selected the date and time, down to the micro-second), the image was recorded is displayed.

From Trigger - When selected the time difference from when the image being displayed was recorded and the moment the camera was triggered will be displayed.

From Image 0 - When selected the time difference from when the image being displayed was recorded and the moment the first full image after a trigger was recorded will be displayed.

From First Image - When selected the time difference from when the image being displayed was recorded and the moment the first image of the cine was recorded will be displayed.

File Name - Displays the name of the file specified during the save process.

Image Number - Specifies the number of the image, starting with the first image in the cine.

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Image Number From Zero - Specifies the number of the image, starting from the first image in the cine, after the trigger.

Camera Version - Indicates the camera model used to record the cine.

Acquired Resolution - Displays the width x height the cine was recorded at.

Rate - Indicates the Frame Rate setting at the time the images were recorded.

Exposure - Indicates the exposure setting for the image being displayed.

EDR Exposure - Indicates the Extreme Dynamic Range Exposure time setting at the time the images were recorded.

First and Last Image - Indicates the first and last image number of the images contained within the edited cine file.

Duration - Indicates the duration of the file.

Signals - Displays the values of all signals for each frame, captured via an attached Data Acquisition Unit.

Range Data - Displays range data information supplied by a tracking mount system to the camera via the Range Data connector.

Description - Indicates the information entered into the Description field in the Play Panel > Cine Info.

NOTE

All the optional lines, if selected, will also be displayed below the cine.

Military - When selected the user may define the following Outside Image fields, that will be displayed outside the recorded cine area, along with the Common Options, and Optional Lines, described above, and any Inside Image information options selected.

Header - This editable field will be displayed just above the recorded cine.

Footer - This editable field will be displayed just below the recorded cine.

NOTE

All the optional lines, if selected, will also be displayed to the right of the cine.

Car Engine

When selected the user may define the following Outside Image fields, that will be displayed outside and below the recorded cine area, along with the Common Options, and Optional Lines, described above, and any Inside Image information options selected.

Engine Speed

Spark Frame

Spark Crank Angle (deg)

Reset Angle (deg)

Cyl. Pressure (bar)

Text

NOTE

All the optional lines, if selected, will be displayed above the cine.

i. Inside Image:

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Time Stamp

Where each image is tagged with the absolute date and time the image was recorded. Enabling this option will display the time stamp information when the file is played back.

From Trigger

When this option is selected the exact time the image was recorded from the time the trigger input was detected will be displayed.

Draw Signals

When available the user can define which analog signal sample information will be displayed in the corners of each image, up to four signals, (only available if the cine file was captured using an attached Data Acquisition Unit and SAM-3 for signal Acquisitions).

Samples per Stamp

Used to display the acquired selected signal samples on each image . The Samples per Stamp value is the number of samples to be displayed in the small corner windows representing the acquired signal. Its minimum value should be the value of "Samples per image" defined in Live Panel>Advanced Settings>Signals.

NOTE

The information displayed inside the image cannot be removed.

7) Specify the Lossy Compression Quality. (This option is only available when saving as a Cine JPEG, LEAD, LEAD JFIF, LEAD JTIF, JPEG, or JTIF file type.)

8) Define the Multihead Options... (Phantom v6 Series camera models only.)

a) Click the Multi-Head Options button

When saving cine files from a Phantom v6 camera the system will, by default, save the images from all four imaging heads into a single cine file. To save a unique cine file for each of the Phantom v6 imaging heads:

i. Select the camera Head or Heads to save in the Multihead Options dialogue window, then

ii. Click the OK button

4. Click the Save button to save the cine file.

RESULT: The Preview Panel will display the Saving Cines..message, and the Preview Panel Status Bar will display a Saving to Flash.. progress indicator.

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4.2.1.1.5 Saving a Cine to Flash Memory

As mentioned earlier in this document, the Save RAM Cine to Flash command is used to save image data recorded in a cameras' DRAM to the Phantom cameras' optionally installed integrated non-volatile Flash memory or to CineMag, and will only be available when the:

- The Phantom camera has the integrated non-volatile Flash memory installed or CineMag attached.
- The camera has a cine file stored in its' DRAM.
- Play Control Panel has been selected, or the
- Manager Control Panel has been selected and a cine file for a specific camera has been selected.

STEP-BY-STEP PROCEDURE

1. Click on the Cine Menu option, then
2. Select the Save RAM Cine to Flash command.

RESULT: The Preview Panel will display a Saving to Flash.. message, and the Preview Panel Status Bar will display a Saving to Flash.. progress indicator.

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4.2.1.1.6 Select&Save Cines to File

The Select&Save Cines to File feature allows the end-user to specify specific cines, or MultiCine memory segments, or cines stored in Flash/CineMag memory, from one or more attached Phantom cameras to save.

NOTE

The attached Phantom camera or cameras have cine files stored in DRAM or in multiple memory segments of DRAM or in Flash/CineMag.

STEP-BY-STEP PROCEDURES

1. Open on the Play Control Panel.
2. Click on the Cine Menu, then
3. Select the Select&Save Cines to File command.

RESULT: The Save Multi Cine dialogue window open.

4. In the Multi Cine dialogue window enable, check, the desired location(s) of the cine files to be saved:
   a. All cameras

      Enable the All cameras option when cine files are to be saved from more Phantom cameras.

RESULT: A camera tab will be displayed for each Phantom camera.

   b. All group cameras

      Enable the All group cameras option when cine files are to be saved from a specific, user-defined, group of Phantom cameras.

RESULT: A camera tab will be displayed for all Phantom cameras associated with the camera group specified via the Play Control Panel>Cine pull-down selection list.

   c. RAM cines

      Enable the RAM cines option if any of the cine files, to be saved, are stored in any of the Phantom camera's DRAM.

RESULT: Any cine file stored in the specified cameras RAM will be displayed in the Phantom camera's tab window.

   d. Flash cines

      Enable the Flash cines option if any of the cine files, to be saved, are stored in any of the Phantom camera's internal Flash memory or attached Phantom CineMag.

RESULT: Any cine file stored in the camera's non-volatile Flash memory, or attached Phantom CineMag, will be displayed in the specific Phantom camera's tab window.

5. Highlight all the cine files to be saved:
   a. Click on the first cine file, then
   b. Hold down the Ctrl key and select the next cine file to be saved.
   c. Repeat until all the cine files, to be saved, have been selected from all the desired cameras.
6. Click the OK button.

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RESULT: The Save Cine dialogue window opens.

7. Follow the appropriate steps below to save the cine files in one of the following formats:

Cine, Cine JPEG, Cine RAW, Multipage TIFF, MXF PAL, MXF NTSC, or QuickTime File Format

8. In the Save Cine dialogue window:

   a. Navigate to the folder the files are to be saved in.

   b. Enter a root filename in the File Name entry field.

   c. Click the down-arrow to the right of the Save as type field, then

   d. Select either the Cine, Cine JPEG, Cine RAW, Multipage TIFF, MXF PAL, MXF NTSC, or QuickTime file format from the Save as Type pull-down selection list.

   e. Check “No Range (full cine always)” if you want to save full cines or set the First image and Image count values to set a save range. If you leave these values as they are, the save range will be the one defined by editing each cine (set Mark In and Mark Out in Play Panel).

   f. Define the Advance Options (Available with Cine, Cine JPEG, Multipage TIFF, MXF PAL, MFX NTSC, QuickTime Formats)

      The Phantom Camera Control application allows the user to choose one of five color interpolation algorithms, (Best, Good, Medium, Fast, Fastest), that will be applied during the Save Cine.. process if the file format you selected is an interpolated one, that means other than raw.

      1) Click the Advanced Options button, and

      2) Select the desired Color Interpolation Algorithm.

NOTE

Once you selected a color interpolation algorithm and saved cine file in a non-raw, interpolated format you cannot apply another algorithm on the same saved cine by saving it again. In this case, the algorithm's options will be ignored.

   g. Define the desired Border Data

      1) Click the Border Data button, then

      2) Select the information you want to be added to the cine or to the image, specified in the Border data dialogue window:

         a) Outside Image:

            None - When selected the user may specify the Inside Image options.

            Standard - When selected the user may define the following Common Options, and Optional Lines, that will be displayed just below the recorded cine, along with any Inside Image information fields specified:

            Common Options:

               Font Size - Specifies the font size the information will be displayed at.

            Optional Lines:

               Time Format - indicates the type of time stamp information to be displayed, including:

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No time stamp - When selected no time stamp information will be displayed.

Absolute Time - When selected the date and time, down to the micro-second), the image was recorded is displayed.

From Trigger - When selected the time difference from when the image being displayed was recorded and the moment the camera was triggered will be displayed.

From Image 0 - When selected the time difference from when the image being displayed was recorded and the moment the first full image after a trigger was recorded will be displayed.

From First Image - When selected the time difference from when the image being displayed was recorded and the moment the first image of the cine was recorded will be displayed.

File Name - Displays the name of the file specified during the save process.

Image Number - Specifies the number of the image, starting with the first image in the cine.

Image Number From Zero - Specifies the number of the image, starting from the first image in the cine, after the trigger.

Camera Version - Indicates the camera model used to record the cine.

Acquired Resolution - Displays the width x height the cine was recorded at.

Rate - Indicates the Frame Rate setting at the time the images were recorded.

Exposure - Indicates the exposure setting for the image being displayed.

EDR Exposure - Indicates the Extreme Dynamic Range Exposure time setting at the time the images were recorded.

First and Last Image - Indicates the first and last image number of the images contained within the edited cine file.

Duration - Indicates the duration of the file.

Signals - Displays the values of all signals for each frame, captured via an attached Data Acquisition Unit.

Range Data - Displays range data information supplied by a tracking mount system to the camera via the Range Data connector.

Description - Indicates the information entered into the Description field in the Play Panel > Cine Info.

NOTE

All the optional lines, if selected, will also be displayed below the cine.

Military - When selected the user may define the following Outside Image fields, that will be displayed outside the recorded cine area, along with the Common Options, and Optional Lines, described above, and any Inside Image information options selected.

Header - This editable field will be displayed just above the recorded cine.

Footer - This editable field will be displayed just below the recorded cine.

NOTE

All the optional lines, if selected, will also be displayed to the right of the cine.

Car Engine - When selected the user may define the following Outside Image fields, that

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will be displayed outside and below the recorded cine area, along with the Common Options, and Optional Lines, described above, and any Inside Image information options selected.

Engine Speed

Spark Frame

Spark Crank Angle (deg)

Reset Angle (deg)

Cyl. Pressure (bar)

Text

NOTE

All the optional lines, if selected, will be displayed above the cine.

b) Inside Image:

time stamp - Where each image is tagged with the absolute date and time the image was recorded. Enabling this option will display the time stamp information when the file is played back.

From Trigger - When this option is selected the exact time the image was recorded from the time the trigger input was detected will be displayed.

Draw Signals - When available the user can define which analog signal sample information will be displayed in the corners of each image, up to four signals, (only available if the cine file was captured using an attached Data Acquisition Unit and SAM-3 for signal Acquisitions).

Samples per Stamp - Used to display the acquired selected signal samples on each image . The Samples per Stamp value is the number of samples to be displayed in the small corner windows representing the acquired signal. Its minimum value should be the value of "Samples per image" defined in Live Panel>Advanced Settings>Signals.

NOTE

The information displayed inside the image cannot be removed.

h. Specify the Lossy Compression Quality. (This option is only available when saving as a Cine JPEG, LEAD, LEAD JFIF, LEAD JTIF, JPEG, or JTIF file type.)

i. Click the Save button to save the cine file.

RESULT: The Preview Panel displays a Saving Cine.. message , and the Preview Panel Status Bar displays a Saving.. progress indicator. The files will be saved with the following name convention: <root_filename>_<camera_name><camera_model><camera_serial_number><Cine#.ext>

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AVI File Format

8. In the Save Cine dialogue window:

   a. Navigate to the folder the files are to be saved in.

   b. Enter a root filename in the File Name entry field.

   c. Click the down-arrow to the right of the Save as type field, then

   d. Select the AVI file format from the Save as Type pull-down selection list.

   e. Check “No Range (full cine always)” if you want to save full cines or set the First image and Image count values to set a save range. If you leave these values as they are, the save range will be the one defined by editing each cine (set Mark In and Mark Out in Play Panel).

   f. Define the Advance Options

      The Phantom Camera Control application allows the user to choose one of five color interpolation algorithms, (Best, Good, Medium, Fast, Fastest), that will be applied during the Save Cine.. process if the file format you selected is an interpolated one, that means other than raw.

      1) Click the Advanced Options button, then

      2) Select the desired Color Interpolation Algorithm.

NOTE

Once you selected a color interpolation algorithm and saved cine file in a non-raw, interpolated format you cannot apply another algorithm on the same saved cine by saving it again. In this case, the algorithm's options will be ignored.

   g. Define desired Border Data

      1) Click the Border Data button, then

      2) Select the information you want to be added to the cine or to the image, specified in the Border data dialogue window:

         a) Outside Image:

            None - When selected the user may specify the Inside Image options.

            Standard - When selected the user may define the following Common Options, and Optional Lines, that will be displayed just below the recorded cine, along with any Inside Image information fields specified:

            Common Options:

               Font Size - Specifies the font size the information will be displayed at.

            Optional Lines:

               Time Format - indicates the type of time stamp information to be displayed, including:

                  No time stamp - When selected no time stamp information will be displayed.

                  Absolute Time - When selected the date and time, down to the micro-second), the image was recorded is displayed.

                  From Trigger - When selected the time difference from when the image being displayed was recorded and the moment the camera was triggered will be

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displayed.

From Image 0 - When selected the time difference from when the image being displayed was recorded and the moment the first full image after a trigger was recorded will be displayed.

From First Image - When selected the time difference from when the image being displayed was recorded and the moment the first image of the cine was recorded will be displayed.

File Name - Displays the name of the file specified during the save process.

Image Number - Specifies the number of the image, starting with the first image in the cine.

Image Number From Zero - Specifies the number of the image, starting from the first image in the cine, after the trigger.

Camera Version - Indicates the camera model used to record the cine.

Acquired Resolution - Displays the width x height the cine was recorded at.

Rate - Indicates the Frame Rate setting at the time the images were recorded.

Exposure - Indicates the exposure setting for the image being displayed.

EDR Exposure - Indicates the Extreme Dynamic Range Exposure time setting at the time the images were recorded.

First and Last Image - Indicates the first and last image number of the images contained within the edited cine file.

Duration - Indicates the duration of the file.

Signals - Displays the values of all signals for each frame, captured via an attached Data Acquisition Unit.

Range Data - Displays range data information supplied by a tracking mount system to the camera via the Range Data connector.

Description - Indicates the information entered into the Description field in the Play Panel > Cine Info.

NOTE

All the optional lines, if selected, will also be displayed below the cine.

Military - When selected the user may define the following Outside Image fields, that will be displayed outside the recorded cine area, along with the Common Options, and Optional Lines, described above, and any Inside Image information options selected.

Header - This editable field will be displayed just above the recorded cine.

Footer - This editable field will be displayed just below the recorded cine.

NOTE

All the optional lines, if selected, will also be displayed to the right of the cine.

Car Engine - When selected the user may define the following Outside Image fields, that will be displayed outside and below the recorded cine area, along with the Common Options, and Optional Lines, described above, and any Inside Image information options selected.

Engine Speed

Spark Frame

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Spark Crank Angle (deg)

Reset Angle (deg)

Cyl. Pressure (bar)

Text

NOTE

All the optional lines, if selected, will be displayed above the cine.

b) Inside Image:

time stamp - Where each image is tagged with the absolute date and time the image was recorded. Enabling this option will display the time stamp information when the file is played back.

From Trigger - When this option is selected the exact time the image was recorded from the time the trigger input was detected will be displayed.

Draw Signals - When available the user can define which analog signal sample information will be displayed in the corners of each image, up to four signals, (only available if the cine file was captured using an attached Data Acquisition Unit and SAM-3 for signal Acquisitions).

Samples per Stamp - Used to display the acquired selected signal samples on each image . The Samples per Stamp value is the number of samples to be displayed in the small corner windows representing the acquired signal. Its minimum value should be the value of "Samples per image" defined in Live Panel>Advanced Settings>Signals.

NOTE

The information displayed inside the image cannot be removed.

h. Specify the Lossy Compression Quality. (This option is only available when saving as a Cine JPEG, LEAD, LEAD JFIF, LEAD JTIF, JPEG, or JTIF file type.)

i. Click the Save button to save the cine file.

9. In the AVI Option dialogue window:

a. Enter the desired playback Frame Rate in the Frame Rate (fps) entry field.

b. Click the down-arrow next to the right of the Video Compressor field, then

c. Select the desired video compressor.

d. Adjust the Compression Quality to the required setting, if available.

e. Click the OK button.

RESULT: The Preview Panel displays a Saving Cine.. message , and the Preview Panel Status Bar displays a Saving.. progress indicator. The files will be saved with the following name convention: <root_filename>_<camera_name><camera_model><camera_serial_number><Cine#.ext>.

The system also creates a .chd file for each cine file saved. The .chd file is the cine header file containing information about the cine file that can be used in the event you wish to convert the file back to a cine file at a later date.

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Image File in Unique Folders

To automatically name a new and unique folder, and sequentially number the individual image files that will be stored inside them:

8. In the Save Cine dialogue window:

   a. Enter the path location followed by the @ (at) sign and single digit number\root filename followed by the + (plus) sign and single digit number in the File Name entry field.

      The single digit number specifies the number of digit places appended to the directories and images.

      For example, C:\Phantom\Images\foldername@2\rootfilename+4.DPX

      - C:\Phantom\Images is the path location.
      - foldername@2 specifies the directory names the image files will be placed into.
      - rootname+4 is the name of the image files that will be created.

   b. Click the down-arrow to the right of the Save as type field, then

   c. Select the image file desired format from the Save as Type pull-down selection list.

   d. Check “No Range (full cine always)” if you want to save full cines or set the First image and Image count values to set a save range. If you leave these values as they are, the save range will be the one defined by editing each cine (set Mark In and Mark Out in Play Panel)..

   e. Define the Advance Options

      The Phantom Camera Control application allows the user to choose one of five color interpolation algorithms, (Best, Good, Medium, Fast, Fastest), that will be applied during the Save Cine.. process if the file format you selected is an interpolated one, that means other than raw.

      1) Click the Advanced Options button, then

      2) Select the desired Color Interpolation Algorithm.

NOTE

Once you selected a color interpolation algorithm and saved cine file in a non-raw, interpolated format you cannot apply another algorithm on the same saved cine by saving it again. In this case, the algorithm's options will be ignored.

   f. Define desired Border Data

      1) Click the Border Data button, then

      2) Select the information you want to be added to the cine or to the image, specified in the Border data dialogue window:

         a) Outside Image:

            None - When selected the user may specify the Inside Image options.

            Standard - When selected the user may define the following Common Options, and Optional Lines, that will be displayed just below the recorded cine, along with any Inside Image information fields specified:

            Common Options:

               Font Size - Specifies the font size the information will be displayed at.

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Optional Lines:

Time Format - indicates the type of time stamp information to be displayed, including:

No time stamp - When selected no time stamp information will be displayed.

Absolute Time - When selected the date and time, down to the micro-second), the image was recorded is displayed.

From Trigger - When selected the time difference from when the image being displayed was recorded and the moment the camera was triggered will be displayed.

From Image 0 - When selected the time difference from when the image being displayed was recorded and the moment the first full image after a trigger was recorded will be displayed.

From First Image - When selected the time difference from when the image being displayed was recorded and the moment the first image of the cine was recorded will be displayed.

File Name - Displays the name of the file specified during the save process.

Image Number - Specifies the number of the image, starting with the first image in the cine.

Image Number From Zero - Specifies the number of the image, starting from the first image in the cine, after the trigger.

Camera Version - Indicates the camera model used to record the cine.

Acquired Resolution - Displays the width x height the cine was recorded at.

Rate - Indicates the Frame Rate setting at the time the images were recorded.

Exposure - Indicates the exposure setting for the image being displayed.

EDR Exposure - Indicates the Extreme Dynamic Range Exposure time setting at the time the images were recorded.

First and Last Image - Indicates the first and last image number of the images contained within the edited cine file.

Duration - Indicates the duration of the file.

Signals - Displays the values of all signals for each frame, captured via an attached Data Acquisition Unit.

Range Data - Displays range data information supplied by a tracking mount system to the camera via the Range Data connector.

Description - Indicates the information entered into the Description field in the Play Panel > Cine Info.

NOTE

All the optional lines, if selected, will also be displayed below the cine.

Military - When selected the user may define the following Outside Image fields, that will be displayed outside the recorded cine area, along with the Common Options, and Optional Lines, described above, and any Inside Image information options selected.

Header - This editable field will be displayed just above the recorded cine.

Footer - This editable field will be displayed just below the recorded cine.

NOTE

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All the optional lines, if selected, will also be displayed to the right of the cine.

Car Engine - When selected the user may define the following Outside Image fields, that will be displayed outside and below the recorded cine area, along with the Common Options, and Optional Lines, described above, and any Inside Image information options selected.

Engine Speed

Spark Frame

Spark Crank Angle (deg)

Reset Angle (deg)

Cyl. Pressure (bar)

Text

NOTE

All the optional lines, if selected, will be displayed above the cine.

b) Inside Image:

time stamp - Where each image is tagged with the absolute date and time the image was recorded. Enabling this option will display the time stamp information when the file is played back.

From Trigger - When this option is selected the exact time the image was recorded from the time the trigger input was detected will be displayed.

Draw Signals - When available the user can define which analog signal sample information will be displayed in the corners of each image, up to four signals, (only available if the cine file was captured using an attached Data Acquisition Unit and SAM-3 for signal Acquisitions).

Samples per Stamp - Used to display the acquired selected signal samples on each image . The Samples per Stamp value is the number of samples to be displayed in the small corner windows representing the acquired signal. Its minimum value should be the value of "Samples per image" defined in Live Panel>Advanced Settings>Signals.

NOTE

The information displayed inside the image cannot be removed.

g. Specify the Lossy Compression Quality. (This option is only available when saving as a Cine JPEG, LEAD, LEAD JFIF, LEAD JTIF, JPEG, JTIF file type.)

h. Click the Save button to save the cine file.

RESULT: The images file, from the cine files selected, will be placed into thier own unigue folders. For example:

C:\Phantom\Images\foldername00\rootfilename0001.DPX

C:\Phantom\Images\foldername00\rootfilename0002.DPX

C:\Phantom\Images\foldername00\rootfilename0003.DPX

...

C:\Phantom\Images\foldername00\rootfilename0001.DPX

C:\Phantom\Images\foldername00\rootfilename0002.DPX

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C:\Phantom\Images\foldername00\rootfilename0003.DPX

applied during the Save Cine.. process if the file format you selected is an interpolated one, that means other than raw .

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4.2.1.2 Camera Menu Procedures

This topic describes the Step-by-Step procedures that can be performed via the Camera pull-down menu.

4.2.1.2.1 Adding a Simulated Camera

The Add Sim Camera command is used to specify which Phantom camera model the user wishes to simulate. You can simulate a camera with or without using an existing .STG file resulted from a camera with the same serial.

For a brief explanation of a .STG, (Serial Tag Number), file, see: Functional Descriptions>Phantom STG, (Serial Tag Number), File.

STEP-BY-STEP PROCEDURE

1. Click on the Camera Menu option, then
2. Select the Add Sim Camera command.
3. When the Add Simulated Camera dialogue window appears:
   a. Using the Camera Version Code Table below, enter the appropriate camera code in the Camera Version (4,5,6,...): field.

CAMERA MODEL	SYNTAX		CAMERA MODEL	SYNTAX
Phantom Miro 1	81		Phantom v10 (standard mode)	10
Phantom Miro 2	82		Phantom v10 (enhanced mode)	101
Phantom Miro 3 (max resolution 640 x 480)	83		Phantom v9.1	91
Phantom Miro 3 (max resolution 800 x 600)	831		Phantom v7.3	73
Phantom Miro 4	84		Phantom v6.2e	62
Phantom 65	650		Phantom v5.1	51
Phantom HD	660		Phantom v4.3	43
Phantom v710	122		Phantom v4.2	42
Phantom v640	130		Image3 w/v10	31
Phantom v310	125		Image3 w/v9.1	n/a
Phantom v210	126		Image3 w/v7.3 or v9	n/a
Phantom v12	120		Phantom CineStation	39

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b. Enter the 4-digit serial number of the Phantom camera being simulated in the Serial field. If you are not trying to simulate an actual Phantom camera that is not connected to the Phantom Control Unit, and are simply simulating a Phantom camera model, assign any 4-digits to simulate the serial number of the camera.

NOTE

Multiple Phantom cameras and/or Image3s can be simulated. However, if the user does not specify a unique serial number the camera will not be added to the Manager Control Panel, Cameras group tree.

c. Click the Add Simulated Camera button.

RESULT: The simulated camera will be displayed under the Cameras group tree in the Manager Control Panel. The image displayed will be the one found in a preview.bmp file in the application's folder.

d. Click the Close button.

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4.2.1.2.2 Copy Parameters To..

The Copy Parameters to.. command is used to copy all of the active Live Control Panel settings to:

All cines in this camera

This command instructs the camera to change the settings, in all memory partitions, to match the settings currently displayed in the Live Control Panel, and will only be available when the selected Phantom camera has been configured to use the MultiCine feature.

All cameras

This command instructs set all the Phantom cameras, in the camera network, to change their Live Control Panel settings to match the setting of the active camera, and will only be available in a multi-Phantom camera, environment.

STEP-BY-STEP PROCEDURES

All cines in this camera

1. With the camera set to use the MultiCine feature, click on the Camera menu in the menu bar.
2. Select the Copy Parameters to.. option.
3. Select the All cines in this camera command.
4. Click the OK button, in the Copy? dialogue window, to copy cine or preview parameters over to all the other partitions in this camera.

RESULT: An information message window will appear, indicating that the active Live Control Panel parameters were either:

- Copied to all cine partitions if the cine partitions are free, no image data stored in them, or
- Have not been overwritten, for a particular cine partition, because a cine file, image data, has been stored into that memory segment. A second message will then be displayed indicating that all other cine partitions have been overwritten with the active Live Control Panel settings.

5. Click the OK to close the informational message window.

RESULT: All free cine partitions will now be set with the new parameter setting specified during the Copy process.

All cameras

1. With the camera being used in a network, multi-camera, environment, click on the Camera menu in the menu bar.
2. Select the Copy Properties to.. option.
3. Select the All cameras command.
4. Click the OK button, in the Copy? dialogue window, to copy active Phantom camera's Live Control Panel parameters over to all the other connected to Phantom cameras.

RESULT: An information message window will appear, indicating that the active Live Control Panel

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parameters were copied to all cameras.

5. Click the OK to close the informational message window.
6. Verify the settings were copied to all other connected to cameras:
   a. Click on the Camera pull-down selection list, then
   b. Select a connect Phantom camera, from the list.
   c. Verify the parameter settings are correct.

NOTE

This feature changes all the Live Control Panel setting to the camera, including the Exposure Time setting. You may need to set this parameter individually for each camera depending on the lighting conditions and the placement of the camera.

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4.2.1.2.3 Loading Camera Settings..

The Load Settings command is used to load previously saved camera parameters or open a camera's Serial Tag Number file to either reset the camera back to its factory default calibration settings, Current Session Reference calibrations, or change the operational mode of the camera into the camera's Flash memory.

For a brief explanation of a .STG, (Serial Tag Number), file, see: Functional Descriptions>Phantom STG, (Serial Tag Number), File.

For a brief explanation of CSR, (Current Session Reference), see: Functional Descriptions>Black Reference/Current Session Reference Adjustments.

STEP-BY-STEP PROCEDURE

1. Click on the Camera menu in the menu bar.
2. Select the Load Settings.. command.
3. When the Load Camera Settings.. dialogue window opens:
   a. Navigate to the folder containing the file to be opened.
   b. Click the down-arrow next to the Files of type: field: and select the type of file being loaded into the camera's Flash memory:
      1) STG files (*.STG) to load a previous saved CSR calibration file.
      2) All files (*.*) to load the camera's previously saved setup parameters.
   c. Click on the file to be loaded.
   d. Click the Open button.

RESULT: The Live Panel will display the following message: "Writing to STG to flash..". The Live Control Panel will be reset to the settings saved in the file being loaded.

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4.2.1.2.4 Saving Camera Settings..

The Save Settings command is used to save the:

- Present camera settings to a setup, (.STP), file for recall at a later date.
- CSR, (Current Session Reference), calibrations to a .STG, (Serial Tag Number), file that can also be recalled at a later date.

All setup files saved to the hard drive can be recalled from the drive by using the Load Settings command.

For a brief explanation of CSR, (Current Session Reference), see: Functional Descriptions>Black Reference/Current Session Reference Adjustments.

For a brief explanation of a .STG, (Serial Tag Number), file, see: Functional Descriptions>Phantom STG, (Serial Tag Number), File.

STEP-BY-STEP PROCEDURE

1. Click on the Camera menu in the menu bar.
2. Select the Save Settings.. command.
3. When the Save As dialogue window opens:
   a. Navigate to the folder the settings file is to be saved to.
   b. Enter the filename of the file being saved in the File name: field.
      If the file being saved contains the:
      1) CSR, (Current Session Reference), calibrations; simply enter the name of the file, for example, 1234_res800x600_rate200_exp997.5_edr0d.
      2) Camera's setup parameters; enter the file name followed by the .STP file extension, for example, 1234_res800x600_rate200_exp997.5_edr0d.stp.

NOTE

The .stp file extension must be added when saving camera setup parameters.

   c. Next to the Save as type: field, click the down-arrow and select the type of file being saved:
      1) .STG files (*.STG) to save the CSR calibrations.
      2) All files (*.*) to save the camera's setup parameters.

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4.2.1.2.5 Deleting All RAM Cines

The Delete All RAM Cines command is used to delete cine file stored in a selected camera's DRAM. This command is extremely useful when the selected camera has been set to use the MultiCine feature.

STEP-BY-STEP PROCEDURE

1. Use one of the following methods to elect the Phantom camera cine files are to be deleted from:
   a. Click on the camera the cine files are to be deleted from in the Manager Control Panel.
   b. Click on the down-arrow next to the Camera field, and selected the camera the cine files are to be deleted from in the Live Control Panel.
   c. Click on the down-arrow next to the Camera field, and selected the camera the cine files are to be deleted from in the Play Control Panel.
   d. Click on the panel of the camera the cine files are to be deleted from in the Preview or Playback Panel.
2. Click on the Camera menu in the menu bar.
3. Select the Delete All RAM Cines command.
4. Click the OK button in the ' all cines from the RAM of the selected cameras?' warning message window.

RESULT: All cine files stored in the selected Phantom camera's DRAM will be deleted.

4.2.1.2.6 Erasing Flash Memory

The Erase Flash Memory command is used to purge all cine files stored in a Phantom camera's optionally installed integrated non-volatile Flash memory module or Phantom CineMag.

STEP-BY-STEP PROCEDURE

1. Click on the Camera menu in the menu bar.
2. Select the Erase Flash Memory command.

RESULT: The Preview/Playback Panels will display an Erasing Flash message along with an Erasing Flash progress indicator. Any cine file stored in the selected camera's integrated non-volatile Flash memory will be removed from the Cameras group in the Manger Control Panel.

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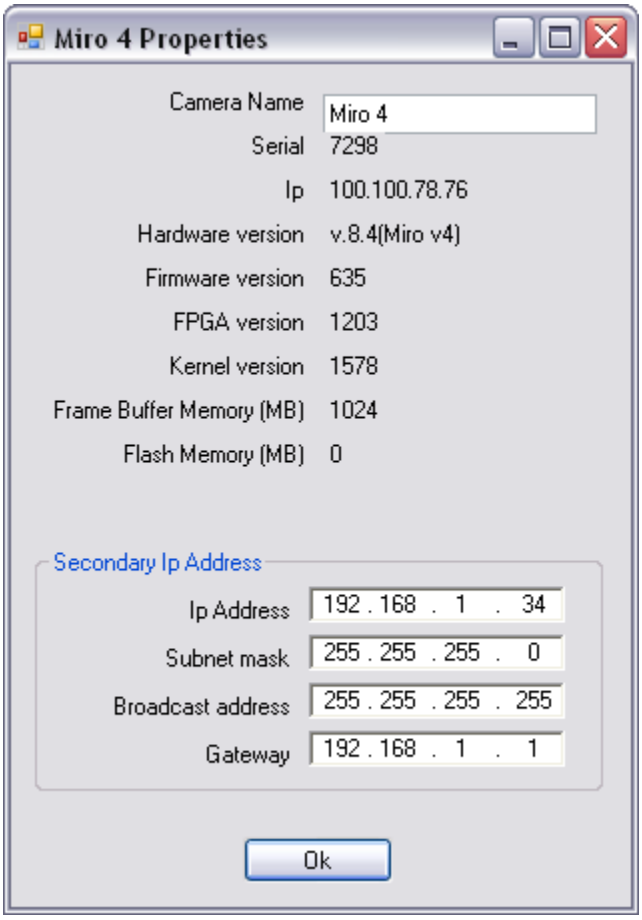
4.2.1.2.7 View Camera Properties

The Properties command can be used to provide information about the connected-to camera.

STEP-BY-STEP PROCEDURE

1. Select a Phantom camera:
   a. In the Manager Control Panel, double-click on the desired camera under the Camera group tree, or
   b. Click on the Preview/Playback Panel of the desired camera.
2. Click on the Camera menu in the menu bar.
3. Select the Properties command.

RESULT: The Properties informational window is displayed with the Serial Number, IP Address, Hardware Code of the connected-to camera, along with the Firmware, FPGA, and Kernel loaded in the camera, as shown.



4. Click the OK button to close the Properties dialogue window.

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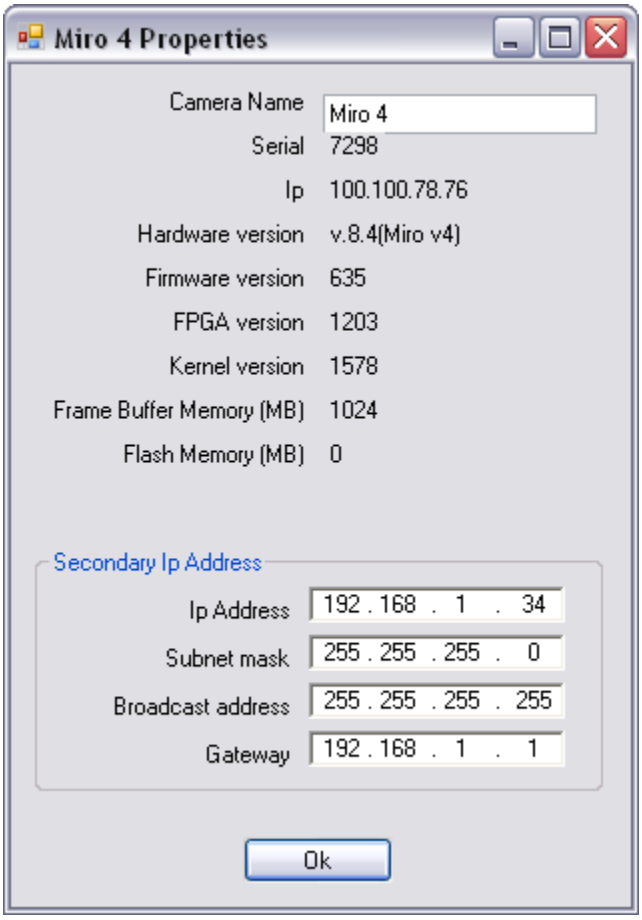
4.2.1.2.8 Assign a Secondary IP Address

The Properties command can be used to assign a secondary IP address to the connected camera.

STEP-BY-STEP PROCEDURE

1. Select a Phantom camera:
   a. In the Manager Control Panel, double-click on the desired camera under the Camera group tree, or
   b. Click on the Preview/Playback Panel of the desired camera.
2. Click on the Camera menu in the menu bar, then
3. Select the Properties command.

RESULT: The Properties dialogue window opens.



4. In the Properties dialogue window enter the appropriate Secondary IP information for the camera, including the:
   a. IP Address
   b. Subnet mask
   c. Broadcast address
   d. Gateway address

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NOTE

If you are not sure what to enter, check with your local network administrator.

5. Click the OK button to close the Properties window.
6. Exit the Phantom Camera Control application, then
7. Remove power from the camera.
8. Change the IP Address and subnet Mask information on the Camera Control Unit to ensure that both the camera and the control unit are assigned to the same network, (ensure that the IP Address is a unique IP address).
9. Restart the camera by re-applying power to the camera, then
10. Restart the Phantom Camera Control application.

NOTE

If the control unit does not detect the camera, re-check the settings of the control unit.

Setting the IP Address of a camera does not remove its default IP address. In the event, you need to verify the camera's user defined IP Address, or made a mistake entering the information, simply reset the control unit's IP Address to 100.100.100.1, and reconnect to the camera making any necessary changes using the steps above.

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4.2.1.3 Tools Menu Procedures

This topic describes the Step-by-Step procedures that can be performed via the Tool pull-down menu.

4.2.1.3.1 Tools - Image Processing Adjustment Procedures

The Tools feature provides several image processing techniques that can be applied to single images or to an entire recorded cine file. These effects may be used alone or in combinations to bring out hidden features and details. The Tools command can be used to:

- Display the image Histogram.
- Perform image processing adjustments.
- Apply various image processing effects.

The type of effects available will be depended upon the type of camera the cine file or image data was recorded from, (i.e., color or monochrome, 8-, 10-, 12-, 14-bit pixel image bit depth, etc.).

NOTE

Not all image processing techniques are appropriate for every image. Vision Research recommends the end-user experiment with the image processing effects to find the best enhancements for their needs.

CAUTION

When using a monitor to apply Image Processing effects, the White Balance control, and all brightness, contrast, gamma, and color adjustments should be changed only when using a monitor that is in correct adjustment. Occasionally, an operator will over adjust monitor settings in extreme lighting conditions, such as in direct sunlight, in an attempt to get a better look at what he is trying to image. "Correcting" the appearance of images on a poorly adjusted monitor will have a negative result on cine file recordings that will later be viewed on a properly adjusted monitor under normal conditions.

STEP-BY-STEP PROCEDURES

1. Select the Phantom camera or cine file the imaging tools are to used with by:
   a. Click on the Preview Panel of the camera, or Playback Panel of the cine file.
   b. Click the Manager tab to open the Manager Control Panel, and
   c. Click on the camera or cine file from their respective group tree.
2. Click on the Tools Menu option, and
3. Select the Image Tools command.
4. Apply the desired image processing effect(s) or filter.

   For a brief description of the supported image processing effects and filters, see; Functional Descriptions>Image Processing Effects and Filters.

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4.2.1.3.2 Firmware Control (Nucleus) - Upgrading Camera Firmware Procedure

The Firmware Control (Nucleus) command allows the end-user to, in one simple operation, load the camera firmware and FPGA, (Field Programmable Gate Array), firmware. It allows the end-user to load firmware files into the selected visible camera, or into a camera which responds to ping command, by introducing its IP address and a value for camera version.

Using this command provides for the upload of firmware files to your camera. After loading the firmware files, the program will disconnect and attempt to reconnect to the camera. It may be necessary to power the camera off then on again for Phantom Camera Control application to reconnect to the camera.

If the application cannot automatically identify the camera you are upgrading, you will have to introduce the IP address and camera version.

Use the following table to find the camera version value of your camera:

Camera Model	Version Code		Camera Model	Version Code
Phantom Miro 1	81		Phantom v10 (standard mode)	10
Phantom Miro 2	82		Phantom v10 (enhanced mode)	101
Phantom Miro 3 (max resolution 640 x 480)	83		Phantom v9.1	91
Phantom Miro 3 (max resolution 800 x 600)	831		Phantom v7.3	73
Phantom Miro 4	84		Phantom v6.2e	62
Phantom 65	650		Phantom v5.1	51
Phantom HD	660		Phantom v4.3	43
Phantom v710	122		Phantom v4.2	42
Phantom v640	130		Image3 w/v10	31
Phantom v310	125		Image3 w/v9.1	n/a
Phantom v210	126		Image3 w/v7.3 or v9	n/a
Phantom v12	120		Phantom CineStation	39

IMPORTANT NOTICES

1. ***The necessary files can be obtained by contacting the Vision Research Technical Support Staff.***
2. ***You should never do a firmware upgrade when running on battery power. Ensure the camera is connected to AC power.***

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3. ***Vision Research highly recommends that you contact our Technical Support staff prior to performing a firmware upgrade to a Phantom v9.0, v7.2, v7.1, v7.0, v5.1, v4.3, v4.2 camera.***
4. ***This Firmware Upgrade Process should never be used to load an earlier version of firmware that is already loaded into the camera, and must not ever be used with an IEEE 1394 camera model.***

STEP-BY-STEP PROCEDURES

1. Contact Vision Research Technical Support for the latest version of the firmware.
2. Create and copy the files to a directory, (folder).
3. Apply AC power to the Phantom camera.

NOTE

Never perform a firmware upgrade when running on battery power.

4. Click on the Tools Menu option, then
5. Select the Firmware Control (Nucleus) command.

RESULT: The Phantom Nucleus application is initiated.

6. In the Phantom Nucleus dialogue window:
   a. Click the down-arrow next to the Camera field and select the camera the firmware upgrade is to be performed on.

RESULT: The IP Address of the selected camera and the Version Code will be automatically entered in the IP: and Version entry field respectively. Also, the Camera Info field will display the Serial Number, and Name of the selected camera, along with the Firmware, FPGA, and Kernel version presently installed in the camera.

   b. To specify a Phantom camera to upgrade manually:
      1) Select the Manual Enter ip + version option from the Camera pull-down list.
      2) Enter the IP address of the Phantom camera to be upgraded in the IP: entry field, then
      3) Enter the camera Version Code, see table above, in the Version: entry field.
      4) Click the Refresh button.

RESULT: The Camera Info field will display the Serial Number, and Name of the selected camera, along with the Firmware, FPGA, and Kernel version presently installed in the camera.

   c. Select the Files to Upload.
      1) Click the **All In One..** button.
         a) Navigate to the directory, (folder), containing the zip file, in the Open a zip file dialogue window. The zip file is used to open and load all the required files for the specified Phantom camera.
         b) Click the Open button.

RESULT: The full file path of the file is displayed next to the All In One.. button.

      2) Click the **Firmware..** button.
         a) Navigate to the directory, (folder), containing the ph7.bin file, in the New Camera Firmware dialogue window, then

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b) Click the Open button.

RESULT: The full file path of the file is displayed next to the Firmware.. button.

3) Click the **FPGA..** button.

a) Navigate to the directory, (folder), containing the ph.bin file, in the New Camera FPGA window, then

b) Click the Open button.

RESULT: The full file path of the file is displayed next to the FPGA.. button.

4) Click the **Flash FPGA..** button.

a) Navigate to the directory, (folder), containing the phflash file, In the New Camera FPGA window, then

b) Click the Open button.

RESULT: The full file path of the file is displayed next to the Flash FPGA.. button.

5) Click the **Cinemag..** button.

a) Navigate to the directory, (folder), containing the file, in the New Camera Cinemag Firmware window, then

b) Click the Open button.

RESULT: The full file path of the file is displayed next to the Cinemag.. button.

6) Click the **Kernel..** button.

a) Navigate to the directory, (folder), containing the file, in the New Camera Kernel window, then

b) Click the Open button.

RESULT: The full file path of the file is displayed next to the Kernel.. button.

d. Click the Upload button.

e. Click the OK button in the "Camera RAM cines will be deleted" warning message window.

f. Click the OK button in the "Proceed with uploading..." message window.

RESULT: The system will display a series of information windows indicating:

- Files are being uploaded.
- Wait for camera to re-boot and press OK .

g. In the Phantom Nucleus window, click the:

1) Refresh button to verify changes, (refer to the Camera Info fields).

2) Click the Close.. button.

h. Click the Close button, and restart the Phantom Camera Control application.

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4.2.1.3.3 Enable/Disable Logging

When enabled the system will generate a PhCon.log file used by Vision Research Engineers to determine if there are any errors with the Phantom Camera Control Application code.

STEP-BY-STEP PROCEDURES

Enable Logging

1. Click on the Tools Menu option, then
2. Select the Enable Logging command.
3. Click the OK button.
4. Exit the Phantom Camera Control Application.
5. Restart the Phantom Camera Control Application.

RESULT: If a log file has been previously created the following Warning message will appear:

A previous log file "C;\Program Files\Phantom\PhCon.log", having the size *nnn*, was found. Would you like to:

1. Delete it and create a new one (Yes)
2. Append the new log to the existing one (No)
3. Stop logging (Cancel)?

6. Click the appropriate button.

Disable Logging

1. Click on the Tools Menu option, then
2. Select the Disable Logging command.
3. Click the OK button.
4. Exit the Phantom Camera Control Application.
5. Restart the Phantom Camera Control Application.

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4.2.1.3.4 Preferences - Phantom Camera Control Preferences

The Preferences command is used to define general, end-user preferred, Phantom Camera Control GUI, (Graphical User Interface), settings.

STEP-BY-STEP PROCEDURE

1. Click on the Tools Menu option, then
2. Select the Preferences command.
3. When the Preferences dialogue window opens:
   a. Enable, (check), the desired **Interface** options:
      1) Start Maximized

         When enabled, (checked), the Phantom Camera Control application is instructed to open in full screen, (maximized).

         If the Start Maximized option is not enabled, (unchecked), the Phantom Camera Control application will open in a standard window.
   b. Select the desired Units option from the pull-down selection lists or use the Presets buttons, (see Units Presets Table below), to specify the parameters' setup value when defining the associated setting in the Live Control Panel>Cine Settings.

Units Presets Table

PRESETS	UNITS			DESCRIPTION
	EXP	EDR	PTF	
Scientific	MicroSec	MicroSec	Frames	The values of Exposure and EDR, (Extreme Dynamic Range), will be specified in microseconds. The maximum value of the Exposure Time depends on the period of the images, that is 1/Sample Rate value. The EDR maximum value is equal to the defined Exposure value. The PTF, (Post Trigger Frames), value is the number of frames, after a trigger signal has been detected by, the selected Phantom camera continues to capture before the recording process stops. The maximum value of Post Trigger Frames in the drop down list depends on the resolution and bit depth set, and on the memory capacity. If PTF value is set to the maximum value in the list, all images in camera's memory will be post trigger frames.

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PRESETS	UNITS			DESCRIPTION
	EXP	EDR	PTF	
Percent	Percent	Percent	Percent	The Exposure value is a percentage of the maximum value. The EDR, (Extreme Dynamic Range), value is a percentage of the Exposure value chosen. The PTF, (Post Trigger Frames), value is a percentage of the maximum value described in the Scientific description.
Cinematography	Degree	Percent	Frames	Value of Exposure is in degrees, (shutter angle). It represents the degree of the open segment of the shutter. The maximum value, 360°, corresponds to a full period of the frame. The EDR, (Extreme Dynamic Range), value is a percentage from the exposure value you choose. The PTF, (Post Trigger Frames), value is the same as what was described in value Scientific description.

c. Specify the **Imaging** options:

1) Enable or disable, (checked or unchecked), respectively, to apply a Smooth Gaussian algorithm to the images being displayed in either the Preview or Playback Panels. For a brief description, see: Tools Menu Procedures>Tools - Image Processing Adjustments>Filters.

2) Change the **BackGround** Color of the Preview and Playback Panel windows.

a) Click the Color button.

b) In the Color dialogue window:

i. Select a basic color from the color pallid, or

ii. Click the Define Custom Colors>> button to specify a color by:

➢ Clicking on an unused Custom color: box, then either:

- Move the cross-hair to the desired color, alternatively
- Enter the desired Red, Green, Blue values.

➢ Click the Add to Custom Colors button.

iii. Click the Ok button.

c) Click the OK button in the Preferences dialogue window.

RESULT: The background color of the Preview and Playback Panels will now be the color specified.

d. Specify the Snapshot parameters used to create an image file, including:

1) Application

a) Specify the application that will be used to create an image file of the image being displayed on in the active Preview/Playback Panel.

2) File Name

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a) Specify the file name that will be assigned to the image file being created in the step above.

3) File Path

a) Specify the complete path where the image file being created, in the steps above, will be at, or

b) Click the Browse button and either:

i. Navigate to the Windows folder where the file is to be saved, alternatively

ii. Click the Make New Folder button, where the file is to be saved.

c) Click the OK button to accept the save location; Click Cancel to ignore the location.

RESULT: The complete file path will be displayed in the File Path entry field.

e. Specify the **Camera Visibility** parameter:

1) See all available cameras.

2) See only previous camera list.

f. Click the **Default Button** to reset all Preference parameters back to factory default settings.

g. Click the **OK Button** to apply Preferences changes, alternatively

h. Click the **Cancel Button** to ignore any changes specified in the Preferences dialogue window.

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4.2.1.4 Window Menu Procedures

This topic describes the Step-by-Step procedures that can be performed via the Window pull-down menu.

4.2.1.4.1 Tile Preview/Playback Panels

The Tile command instructs the Phantom Camera Control application to display all, selected Phantom cameras live, preview images along with any open cine file side-by-side. The Tile display format is extremely useful when making comparisons of cine files, or when judging the effectiveness of various image-processing techniques.

To implement the Tile command:

STEP-BY-STEP PROCEDURE

1. Click on the Window Menu option, then
2. Select the Tile command.

RESULT: All open Panels will be displayed side-by-side (tiled). The images being displayed in the panel may be cropped on the screen: drag the scroll buttons, located on the right and bottom of the panel, to display more of the image.

Alternatively, select the Zoom Fit, , icon to fit the entire image in the panel.

4.2.1.4.2 Auto Tile Preview/Playback Panels

The Auto Tile command instructs the Phantom Camera Control application to automatically display any newly opened Preview/Playback Panel side-by-side (tiled) with any previously opened display panel. To implement the Auto Tile command:

STEP-BY-STEP PROCEDURE

1. Click on the Window Menu option, then
2. Select the Auto Tile command.

RESULT: All newly opened Preview/Playback Panels will be displayed side-by-side (tiled) with all previously open display panels. The images being displayed in the panel may be cropped on the screen: drag the scroll buttons, located on the right and bottom of the panel, to display more of the image.

Alternatively, select the Zoom Fit, , icon to fit the entire image in the panel.

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4.2.1.4.3 Selecting an Open Preview/Playback Panel

The Select File List, located below Auto Tile command, allows the end-user to select which of the opened display panels is to be the active panel.

To select a Preview or Playback Panel from the list of opened panels:

STEP-BY-STEP PROCEDURE

1. Click on the Window Menu option, then
2. Select the desired panel from the selection list.

RESULT: The selected panel will become the active panel, a check mark will be placed next to the active panel in the selection list, and the source of the selected panel will be highlighted in the Manager Control Panel.

4.2.1.5 Help Menu Procedures

At the time of this writing, the Help pull-down menu presently has one command, the About command.

STEP-BY-STEP PROCEDURE

1. Click on the Help Menu option, then
2. Select the About command.

RESULT: The About window is displayed with Phantom Camera Control version information.

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4.2.2 Toolbar Procedures

This topic describes the Step-by-Step procedures that can be performed via the Toolbar icons.

4.2.2.1 Open a Saved Cine File

STEP-BY-STEP PROCEDURE

To open a cine file stored on an external storage device, i.e., Phantom Control Unit, network drive, etc.:

1. Click on the Open File, , icon.
2. In the Open Cine dialogue window:
   a. Navigate to the folder, or directory, containing the cine file to be opened, then
   b. Highlight the cine file to be opened.
   c. Click the Open button.

RESULT: A Playback Panel opens displaying the cine file selected.

4.2.2.2 Save to File

STEP-BY-STEP PROCEDURE

To save a captured cine file that has been recorded into the camera's memory buffer to your systems hard drive, a networked drive, or to some peripheral device:

1. Click the Save to File, , icon.
2. When the Save Cine dialogue window opens:
   a. Navigate to the folder the cine file is to be saved to.
   b. In the File name: field enter the filename of the cine file being saved, (the Phantom Camera Control application will automatically add the file extension).

      When saving the image data the end-user may need to use the Phantom File Naming Convention to specify the filename, for example when saving the image data into an image stack. For a brief description of the various Phantom File Naming Conventions see: Functional Descriptions>Phantom File Naming Convention.
   c. Next to the Save as type: field, click the down-arrow and select the file format the cine file is to be saved as. Vision Research recommends that you save the cine file in the Cine RAW format.

      For a brief description of the various supported file formats, see: Functional Descriptions>Supported File Formats.

NOTE

The software allows the user select how much of the original cine will be saved to the cine file. Each image in the cine is numbered with the number displayed over the middle of the cine editor bar. Discarding images that contain non-useful information allows smaller files, maximizes the use of space on the hard drive, and creates a more interesting cine for viewing.

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d. If you have not edited the cine file using the Play Control Panel, you can edit the cine file by defining the Range of images to save:

1) Enter the number of the First Image in the sequence you want to save.

For example, the event begins at image number 72 in the cine file just recorded. By entering 72, all images recorded prior to image 72 will be discarded and will not be saved to this file.

2) Enter the Image Count representing the total number of images to be saved in this cine file.

For example, if the event that begins at the image number 72 and ends at image 171, enter 100 to discard all images after 171.

e. Define the desired Save Options:

1) Enable 16 bpp

This feature will automatically be enabled, (checked), when the Bit Depth option is set to greater than 8-bits.

For step-by-step procedure to set the Image Pixel Bit Depth see, Step-by-Step Procedures>Live Control Panel Procedures>Camera Settings>Define the Image Pixel Bit Depth.

2) Split Quarters

Presently disabled.

3) Enable XML Header File

Place a check mark in the XML header file enable box to obtain, along with the cine or image files, an XML file describing the header information in XML language. You can open this XML file afterwards by double-clicking on the file name in Windows Explorer. The XML file can be a source of data for other applications.

4) Packed

Place a check mark in the Packed enable box to save a Packed RAW cine file from a Phantom CineMag.

For a description on the Packed file format see, Functional Descriptions>Supported File Formats.

5) Define the Advance Options

The Phantom Camera Control application allows the user to choose one of five color interpolation algorithms, (Best, Good, Medium, Fast, Fastest), that will be applied during the Save Cine.. process if the file format you selected is an interpolated one, that means other than raw.

a) Click the Advanced Options button, then

b) Select the desired Color Interpolation Algorithm.

NOTE

Once you selected a color interpolation algorithm and saved cine file in a non-raw, interpolated format you cannot apply another algorithm on the same saved cine by saving it again. In this case, the algorithm's options will be ignored.

6) Define desired Border Data

a) Click the Border Data button, then

b) Select the information you want to be added to the cine or to the image, specified in the Border data dialogue window:

i. Outside Image:

None - When selected the user may specify the Inside Image options.

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Standard - When selected the user may define the following Common Options, and Optional Lines, that will be displayed just below the recorded cine, along with any Inside Image information fields specified.

Common Options:

Font Size - Specifies the font size the information will be displayed at.

Optional Lines:

Time Format - indicates the type of time stamp information to be displayed, including:

No time stamp - When selected no time stamp information will be displayed.

Absolute Time - When selected the date and time, down to the micro-second), the image was recorded is displayed.

From Trigger - When selected the time difference from when the image being displayed was recorded and the moment the camera was triggered will be displayed.

From Image 0 - When selected the time difference from when the image being displayed was recorded and the moment the first full image after a trigger was recorded will be displayed.

From First Image - When selected the time difference from when the image being displayed was recorded and the moment the first image of the cine was recorded will be displayed.

File Name - Displays the name of the file specified during the save process.

Image Number - Specifies the number of the image, starting from the first image in the cine.

Image Number From Zero - Specifies the number of the image, starting from the first image in the cine, after the trigger.

Camera Version - Indicates the camera model used to record the cine.

Acquired Resolution - Displays the width x height the cine was recorded at.

Rate - Indicates the Frame Rate setting at the time the images were recorded.

Exposure - Indicates the exposure setting of the image being displayed.

EDR Exposure - Indicates the Extreme Dynamic Range Exposure time setting at the time the images were recorded.

First and Last Image - Indicates the first and last image number of the images contained within the edited cine file.

Duration - Indicates the duration of the file.

Signals - Displays the values of all signals for each frame, captured via an attached Data Acquisition Unit.

Range Data - Displays range data information supplied by a tracking mount system to the camera via the Range Data connector.

Description - Indicates the information entered into the Description field in the Play Panel > Cine Info.

NOTE

All the optional lines, if selected, will also be displayed below the cine.

Military - When selected the user may define the following Outside Image fields, that will be displayed outside the recorded cine area, along with the Common Options, and Optional Lines, described above, along with any Inside Image information options selected.

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Header - This editable field will be displayed just above the recorded cine.

Footer - This editable field will be displayed just below the recorded cine.

NOTE

All the optional lines, if selected, will also be displayed to the right of the cine.

Car Engine - When selected the user may define the following Outside Image fields, that will be displayed outside and below the recorded cine area, along with the Common Options, and Optional Lines, described above, along with any Inside Image information options selected.

Engine Speed

Spark Frame

Spark Crank Angle (deg)

Reset Angle (deg)

Cyl. Pressure (bar)

Text

NOTE

All the optional lines, if selected, will be displayed above the cine.

ii. Inside Image:

Time Stamp - Where each image is tagged with the absolute date and time the image was recorded. Enabling this option will display the time stamp information when the file is played back.

From Trigger - When this option is selected the exact time the image was recorded from the time the trigger input was detected will be displayed.

Draw Signals - When available the user can define which analog signal sample information will be displayed in the corners of each image, up to four signals, (only available if the cine file was captured using an attached Data Acquisition Unit and SAM-3 for signal Acquisitions).

Samples per Stamp - Used to display the acquired selected signal samples on each image . The Samples per Stamp value is the number of samples to be displayed in the small corner windows representing the acquired signal. Its minimum value should be the value of "Samples per image" defined in Live Panel>Advanced Settings>Signals.

NOTE

The information displayed inside the image cannot be removed.

7) Specify the Lossy Compression Quality. (This option is only available when saving as a Cine JPEG, LEAD, LEAD JFIF, LEAD JTIF, JPEG, or JTIF file type.)

8) Define the Multihead Options... (Phantom v6 Series camera models only.)

a) Click the Multi-Head Options button:

When saving cine files from a Phantom v6 camera the system will, by default, save the images from all four imaging heads into a single cine file. To save a unique cine file for each of the Phantom v6 imaging heads:

i. Select the camera Head or Heads to save in the Multihead Options dialogue window, then

ii. Click the OK button.

5. Click the Save button to save the cine file.

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4.2.2.3 Save All Cines From This Camera..

The Save All Cine From This Camera.. icon is used to save all cine image data recorded in the selected Phantom camera to a user specified location. This feature is extremely useful when the MultiCine feature has been implemented in the camera as it will save all memory segments, with image data stored into it, to the specified location.

The icon will only be available when the:

- Camera has a cine file stored in its' DRAM.
- Play Control Panel has been selected.
- Manager Control Panel has been selected and a cine file for a specific camera has been selected.

STEP-BY-STEP PROCEDURE

1. Click on the Save All Cine From This Camera.., , icon.
2. When the Save Cine dialogue window opens:
   a. Navigate to the folder the cine file is to be saved to.
   b. In the File name field enter a root name to which there will be automatically appended an extension (Cine#) for each of the cine.
   c. Next to the Save as type: field, click the down-arrow and select the file format the cine file is to be saved as. Vision Research recommends that you save the cine file in the Cine RAW format.

      For a brief description of the various supported file formats, see: Functional Descriptions>Supported File Formats.

NOTE

The software allows the user select how much of the original cine will be saved to the cine file. Each image in the cine is numbered with the number displayed over the middle of the cine editor bar. Discarding images that contain non-useful information allows smaller files, maximizes the use of space on the hard drive, and creates a more interesting cine for viewing..

   d. Check “No Range (full cine always)” if you want to save full cines or set the First image and Image count values to set a save range. If you leave these values as they are, the save range will be the one defined by editing each cine (set Mark In and Mark Out in Play Panel).
   e. Define the desired Save Options:
      1) Enable 16 bpp

         This feature will automatically be enabled, (checked), when the Bit Depth option is set to greater than 8-bits.

         For step-by-step procedure to set the Image Pixel Bit Depth see, Step-by-Step Procedures>Live Control Panel Procedures>Camera Settings>Define the Image Pixel Bit Depth.

      2) Split Quarters

         Presently disabled.

      3) Enable XML Header File

         Place a check mark in the XML header file enable box to obtain, along with the cine or image

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files, an XML file describing the header information in XML language. You can open this XML file afterwards by double-clicking on the file name in Windows Explorer. The XML file can be a source of data for other applications.

4) Packed

Place a check mark in the Packed enable box to save a Packed RAW cine file from a Phantom CineMag.

For a description on the Packed file format see, Functional Descriptions>Supported File Formats.

5) Define the Advance Options

The Phantom Camera Control application allows the user to choose one of five color interpolation algorithms, (Best, Good, Medium, Fast, Fastest), that will be applied during the Save Cine.. process if the file format you selected is an interpolated one, that means other than raw.

a) Click the Advanced Options button, then

b) Select the desired Color Interpolation Algorithm.

NOTE

Once you selected a color interpolation algorithm and saved cine file in a non-raw, interpolated format you cannot apply another algorithm on the same saved cine by saving it again. In this case, the algorithm's options will be ignored.

6) Define desired Border Data

a) Click the Border Data button, then

b) Select the information you want to be added to the cine or to the image, specified in the Border data dialogue window:

i. Outside Image:

None - When selected the user may specify the Inside Image options.

Standard - When selected the user may define the following Common Options, and Optional Lines, that will be displayed just below the recorded cine, along with any Inside Image information fields specified:

Common Options:

Font Size - Specifies the font size the information will be displayed at.

Optional Lines:

Time Format - indicates the type of time stamp information to be displayed, including:

No time stamp - When selected no time stamp information will be displayed.

Absolute Time - When selected the date and time, down to the micro-second), the image was recorded is displayed.

From Trigger - When selected the time difference from when the image being displayed was recorded and the moment the camera was triggered will be displayed.

From Image 0 - When selected the time difference from when the image being displayed was recorded and the moment the first full image after a trigger was recorded will be displayed.

From First Image - When selected the time difference from when the image being displayed was recorded and the moment the first image of the cine was recorded will be displayed.

File Name - Displays the name of the file specified during the save process.

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Image Number - Specifies the number of the image, starting with the first image in the cine.

Image Number From Zero - Specifies the number of the image, starting from the first image in the cine, after the trigger.

Camera Version - Indicates the camera model used to record the cine.

Acquired Resolution - Displays the width x height the cine was recorded at.

Rate - Indicates the Frame Rate setting at the time the images were recorded.

Exposure - Indicates the exposure setting of the image being displayed.

EDR Exposure - Indicates the Extreme Dynamic Range Exposure time setting at the time the images were recorded.

First and Last Image - Indicates the first and last image number of the images contained within the edited cine file.

Duration - Indicates the duration of the file.

Signals - Displays the values of all signals for each frame, captured via an attached Data Acquisition Unit.

Range Data - Displays range data information supplied by a tracking mount system to the camera via the Range Data connector.

Description - Indicates the information entered into the Description field in the Play Panel > Cine Info.

NOTE

All the optional lines, if selected, will also be displayed below the cine.

Military - When selected the user may define the following Outside Image fields, that will be displayed outside the recorded cine area, along with the Common Options, and Optional Lines, described above, along with any Inside Image information options selected.

Header - This editable field will be displayed just above the recorded cine.

Footer - This editable field will be displayed just below the recorded cine.

NOTE

All the optional lines, if selected, will also be displayed to the right of the cine.

Car Engine - When selected the user may define the following Outside Image fields, that will be displayed outside and below the recorded cine area, along with the Common Options, and Optional Lines, described above, along with any Inside Image information options selected.

Engine Speed

Spark Frame

Spark Crank Angle (deg)

Reset Angle (deg)

Cyl. Pressure (bar)

Text

NOTE

All the optional lines, if selected, will be displayed above the cine.

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i. Inside Image:

Time Stamp - Where each image is tagged with the absolute date and time the image was recorded. Enabling this option will display the time stamp information when the file is played back.

From Trigger - When this option is selected the exact time the image was recorded from the time the trigger input was detected will be displayed.

Draw Signals - When available the user can define which analog signal sample information will be displayed in the corners of each image, up to four signals, (only available if the cine file was captured using an attached Data Acquisition Unit and SAM-3 for signal Acquisitions).

Samples per Stamp - Used to display the acquired selected signal samples on each image . The Samples per Stamp value is the number of samples to be displayed in the small corner windows representing the acquired signal. Its minimum value should be the value of "Samples per image" defined in Live Panel>Advanced Settings>Signals.

NOTE

The information displayed inside the image cannot be removed.

7) Specify the Lossy Compression Quality. (This option is only available when saving as a Cine JPEG, LEAD, LEAD JFIF, LEAD JTIF, JPEG, or JTIF file type.)

8) Define the Multihead Options... (Phantom v6 Series camera models only.)

a) Click the Multi-Head Options button.

When saving cine files from a Phantom v6 camera the system will, by default, save the images from all four imaging heads into a single cine file. To save a unique cine file for each of the Phantom v6 imaging heads:

i. Select the camera Head or Heads to save in the Multihead Options dialogue window, then

ii. Click the OK button.

3. Click the Save button to save the cine file.

RESULT: The Preview Panel displays a Saving Cine.. message , and the Preview Panel Status Bar displays a Saving.. progress indicator.

The cine files for each of the memory segments being saved, from the selected camera, will be saved with the user specified file name along with an appended extension (Cine#) for each of the cine files. For example: The user specified name in this example is <MultiCine>. The software saved the cameras' four memory segment cine files as follows:

multicine_Cam_Miro 4_Cine_1.cine

multicine_Cam_Miro 4_Cine_2.cine

multicine_Cam_Miro 4_Cine_3.cine

multicine_Cam_Miro 4_Cine_4.cine

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4.2.2.4 Image Tools

STEP-BY-STEP PROCEDURES

To display an image Histogram, perform image processing adjustments, or apply various image processing effects to the images displayed in either the Preview or Playback Panels:

1. Click on the Image Tools, , icon, then
2. Apply the desired image processing effect(s), or filter.

   For a brief description of the supported image processing effects and filters, see; Functional Descriptions>Image Processing Effects and Filters.
3. Click the Exit, , icon, to close the Image Tools dialogue window.

NOTE

Several image processing techniques can be applied to the entire recorded alone or in combinations to bring out hidden features and details. The type of effects available will be depended upon the type of camera the cine or images were recorded from, (color or monochrome, 8-, 10-, 12-, 14-bit pixel image bit depth).

Not all image processing techniques are appropriate for every image. Vision Research recommends the user experiment with the image processing effects to find the best enhancements for their needs.

CAUTION

When using a monitor to apply image processing effects, the White Balance control, and all brightness, contrast, gamma, and color adjustments should be changed only when using a monitor that is in correct adjustment. Occasionally, an operator will over adjust the monitor settings in extreme lighting conditions, such as in direct sunlight, in an attempt to get a better look at what he is trying to image. "Correcting" the appearance of images on a poorly adjusted monitor will have a negative result on cine recordings that will later be viewed on a properly adjusted monitor under normal conditions.

4.2.2.5 Video Out

STEP-BY-STEP PROCEDURES

To define Vide Out parameters:

1. Click on the Video Out, , icon, then
2. Apply the desired video options.

   For details on how to utilize the Phantom Video Play see: Phantom Video Player Help File.

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4.2.2.6 Snapshot

STEP-BY-STEP PROCEDURES

To create an image file of the image presently being displayed in the Preview/Playback Panel when the SnapShot icon is selected.

1. Click on the Snapshot, , icon, then
2. Refer to the Snapshot Application Manufactures Help File for details on using the specified application to edit and save the captured image.

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4.2.3 Preview/Playback Panel Procedures

This topic describes the Step-by-Step procedures that can be performed via the Preview or Playback Panels.

4.2.3.1 Performing a White Balance Adjustment

Because of the different "colors" of various types of light sources, a color cameras' preview images may have a color tint that may not appear quite right during setup. The Phantom camera has several adjustment methods to assist in correcting image color. Using the fast and easy to use White Balance control should be the first step in color adjustment. Failure to perform a white balance could result in an unsightly, unnatural color cast.

A white balance adjustment can be performed within a Preview Panel or a Playback Panel, on a preview image or on a RAM/Flash/CineMag/file cine image.

To perform a White Balance adjustment:

STEP-BY-STEP PROCEDURE

1. Move the cursor onto the image displayed in either the Preview Panel.
2. Locate an area that resembles white, and note the information in the Status Bar located below the panel.

NOTE

The dimensions of this area should be approximately 32x32 pixels, (the cursor itself is 32x32 pixels in size), and the pixels should not be saturated.

With the cursor in the area you have chosen, look at the three RGB values separated by commas listed to the right of "RGB:" listing in the Status Bar. These values represent the color values of the red, green, and blue pixels under the cursor. Zero equals "no value," and 255 equals "saturation for an 8-bit image pixel depth, 1024 for 10-bit images, 4096 for 12-bit images, and 16384 for 14-bit image pixel depth." A display of 0,0,0 would equal black, and 255,255,255 would equal saturated white, (no color), for an 8-bit image, and so on.

3. With the cursor in the center region of your chosen white reference area pick the spot that gives you the highest values for RGB, but one with NO value that exceeds the near saturated value.
4. Right click on this area.

CAUTION

White Balance Adjustment is not reliable if performed over an area with any saturated pixels.

5. Select the White Balance command in the pop-up window to perform a White Balance calibration adjustment, alternatively
6. Click anywhere, other than on the White Balance command in the pop-up window, in the Preview Panel to cancel the White Balance process.

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4.2.4 Manager Control Panel Procedures

This section describes the Step-by-Step procedures that can be performed via the Manager Control Panel.

4.2.4.1 Individual Camera Control

STEP-BY-STEP PROCEDURE

1. Move the mouse over the desired available Phantom camera you wish to connect to, then
2. Double-click the left mouse key.

RESULT: A Preview Panel opens displaying a live preview image from the selected camera.

NOTE

The Phantom Camera Control application allows multiple cameras, and multiple cine files to be accessed and controlled. However, when using this approach to control a Phantom camera only one camera or cine file can be active in any one time.

4.2.4.2 Simultaneous Multiple (Group) Camera Control

A sub-group can contain multiple Phantom cameras, (under the Camera Group), that can be accessed in the Live Control Panel to control multiple Phantom cameras simultaneously, or it can contain multiple cine files, (under the Cine Group), that can be accesses in the and Play Control Panels to review multiple cine files simultaneously.

NOTE

Phantom cameras and cine file cannot be associated with multiple groups. However, any Phantom camera or cine file under the sub-group tree can be controlled or reviewed respectively. For example, Files Sub-Group1 contains; cine1, cine2, and cine3, along with another sub-group Files Sub-Group2. Files Sub-Group2 contains; cine4, cine5, and cine6, and if Files Sub-Group2 is selected in the Play Control Panel; cine4, cine5, and cine6 can be reviewed simultaneously. If Files Sub-Group1 is selected all six cine files can be reviewed simultaneously.

STEP-BY-STEP PROCEDURE

In the Manager Control Panel:

1. Highlight the Cameras Group, or sub-group, to create a sub-group under, then
2. Click the New Group Folder, , button.
3. Enter the desired name for the new group.

RESULT: A sub-group, new folder, will be placed under the Group selected.

4. Move the mouse over the available Phantom camera you wish to connect to.
5. Hold down the left mouse key, and simultaneously

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6. Drag the desired camera to the sub-group folder created in Step 3, then
7. Release the left mouse-key.

RESULT: The selected camera will be placed into the sub-group folder.

8. Repeat Steps 4 through 7 until all the desired Phantom cameras have been placed into the sub-group folder.

4.2.4.3 Delete a Sub-Group, Camera, or Cine File

STEP-BY-STEP PROCEDURE

To delete a Group, Sub-Group, Camera, or Cine File:

1. Highlight the object you wish to delete, then
2. Click the Delete, , button.

RESULT: The selected object will be removed from the Manager Control Panel.

CAUTION

Removing a Group or Sub-Group with multiple groups, cameras, or cine files under it will move all the objects into the tree root.

4.2.4.4 Opening a Cine File from Camera Memory or CineMag

STEP-BY-STEP PROCEDURE

To open a cine file stored in a Phantom camera's DRAM, non-volatile Flash memory, or CineMag:

1. Place the mouse over the cine file you wish to open, then
2. Double-click the left mouse key.

RESULT: A Playback Panel opens displaying the cine file from the selected camera's memory.

NOTE

The Phantom Camera Control application allows multiple cameras, and/or multiple cine files to be accessed simultaneously.

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4.2.4.5 Opening a Cine File Under the Files Group Tree

STEP-BY-STEP PROCEDURE

To open a cine file under the File Group tree:

1. Place the mouse over the cine file you wish to open, then
2. Double-click the left mouse key.

RESULT: A Playback Panel opens displaying the cine file from the selected camera's memory.

NOTE

The Phantom Camera Control application allows multiple cameras, and/or multiple cine files to be accessed simultaneously.

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4.2.5 Live Control Panel Procedures

This section describes the Step-by-Step procedures that can be performed via the Live Control Panel.

4.2.5.1 Camera Settings

This topic describes the Step-by-Step procedures that can be performed Camera Settings selector.

4.2.5.1.1 Synchronize or Set the Internal Clock of a Phantom Camera

STEP-BY-STEP PROCEDURE

Synchronize Time Stamp Clock Procedure

1. Click the Live Control Panel Tab.
2. Click on Camera Settings.
3. Click the Set button.
4. Click the Update and Set button to synchronize the Current Camera Time with the Computer Time in the Set Camera Time dialogue window.
5. Click the Close button to close the Set Camera Time dialogue window.

RESULT: The Current Camera Time and the Computer Time are identical, synchronized.

Set Time Stamp Clock Procedure

1. Click the Live Control Panel Tab.
2. Click on Camera Settings.
3. Click the Set button.
4. In the Set Camera Time dialogue window:
   a. Click the down-arrow to the right of the New Camera Time entry window, then
   b. Navigate to, and select the desired date from the pop-up calendar window.
   c. Use the up/down arrows next to the Time entry window, then
   d. Select the desired time.
   e. Click the Set button to temporarily adjust the time stamp clock to the date and time specified.
5. Click the Close button to close the Set Camera Time dialogue window.

RESULT: The Current Camera Time adjusts to the date and time specified.

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4.2.5.1.2 Specify the Time Zone Reference

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Camera Settings.
3. Select the desired Time Zone Reference radial button.
   a. Local

      When Local is selected, the attached Phantom Control Units; date and time settings are used as the time reference.

   b. utc (GMT)

      When utc is selected the date and time reference will be adjusted to Universal Time Clock (utc), formally referred to as Greenwich Mean Time (GMT). The adjustment will be the time difference from the date and time settings of the attached Phantom Control Unit to the universal time clock. The Universal Time option will append "utc" text to the Camera Settings>Time information.

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4.2.5.1.3 Perform a CSR, (Current Session Reference), Calibration Adjustment

Use CSR, (Current Session Reference, to calibrate the image for current Cine Settings parameters. The Phantom Camera Control application will compute the offsets specific to the currently defined parameters, obtaining a more precise compensation of the pixel errors. The CSR, (Current Session Reference), processes is similar to Black Reference calibration adjustment.

Vision Research recommends that the CSR calibration adjustment process be performed before recording a single cine configuration or a MultiCine configuration with all cine partitions having the same acquisition parameters.

If the MultiCine partitions have different setup values, and the Advanced Settings>Auto Black Reference option is not enabled because the camera does not employ an internal or external automatic mechanical shutter, the end-user should perform a CSR calibration adjustment on each cine partition separately, just before each cine is recorded

For details on the Automatic Shutter Lens Mount see: Accessories, Peripherals, and Miscellaneous Features>Automatic Shutter Lens Mount Installation.

STEP-BY-STEP PROCEDURE

NOTE

Before performing a Current Session Reference Adjustment ensure that the EDR, Extreme Dynamic Range), Exposure setting is set to zero, and the Auto Exposure and Image-Based Auto-Trigger features are disabled.

Performing a Current Session Reference - Image Calibration

1. Click the Live Control Panel Tab.
2. Click on Cine Settings and define the following parameters prior to performing a CSR calibration adjustment:
   a. Resolution,
   b. Sample Rate, and
   c. Exposure Time.
3. Click on Camera Settings.
4. Click the CSR button.
5. If the camera does not have an internal or external automatic shutter mechanism, when the Current Session Reference informational window instructing you to "Please, cover the camera lens." appears, cover the lens with a lens cap to ensure the sensor is in complete darkness, then
   a. Click the OK button to start the CSR calibration adjustment, alternately
   b. Click the Cancel button to cancel the CSR process.

NOTE

If the Phantom camera is equipment with either an internal or external auto-shutter the end-user will not need to cover the lens with the lens cap as the sensor will be devoid of any light by the auto-shutter mechanism.

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RESULT: A Current Session Reference.. message along with a Current Session Reference status indicator will be displayed in the Preview Panel of the Phantom camera the CSR calibration adjustments are being performed on.

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4.2.5.1.4 Perform a Black Reference Calibration Adjustment

For certain types of cameras, after a camera comes up to its operating temperature, or after changing camera settings, calibrating the camera to a black reference will help ensure you get the best possible images from your Phantom camera.

A black reference measures the value of each pixel with no light on it (black) and stores the values in a calibration file (called an “STG”). Later, the camera firmware can use those values to ensure that all sensor pixels are providing the same value for equivalent amounts of light.

STEP-BY-STEP PROCEDURE

NOTE

Before performing a Black Reference ensure that the EDR, Extreme Dynamic Range), Exposure setting is set to zero, and the Auto Exposure and Image-Based Auto-Trigger features are disabled.

1. Copy the factory-supplied STG file to a backup .STG folder, on the local hard drive of the Phantom Control Unit computer, before performing the Black Reference calibration adjustment.
2. Click on Camera Settings.
3. Click the Black Reference button.
4. When the Black Reference informational window instructing you to "Please, cover the camera lens." appears, cover the lens with a lens cap to ensure the sensor is in complete darkness, then
   a. Click the OK button to start the Black Reference calibration adjustment, alternately
   b. Click the Cancel button to cancel the Black Reference process.

RESULT: A Black Reference.. message along with a Black Reference status indicator will be displayed in the Preview Panel of the Phantom camera the Black Reference calibration adjustments are being performed on. The <camera serial number>.STG file will be overwritten with the new calibrations.

5. When the Save to camera dialogue window appears:
   a. Click the Yes button to save the new Black Reference calibrations to the selected Phantom camera's non-volatile memory, alternately
   b. Click the No button to proceed without saving the new Black Reference calibrations to the selected Phantom camera's non-volatile memory.

RESULT: A Write in camera.. message will be displayed in the selected camera's Preview Panel, along with a Write in camera status indicator in the status bar of the selected camera's Preview Panel.

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4.2.5.1.5 Define the Image Pixel Bit Depth

A variety of the Phantom camera sensors have the ability to record and save 8-, 10-, 12-, or 14-bit values, (gray scale level images), that are transferred to the computer as either 16-bit or 8-bit words. By default these Phantom cameras display 8-bit, (256 gray scale level), images. The 8-bits used to display these images are the most significant, or high order, bits of 14-bit values.

NOTE

Both 8-bit to 14-bit images need exactly the same amount of light to saturate the sensor. What differs is the fineness in the number of levels recorded.

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Camera Settings.
3. Click the down-arrow to the right of the Bit Depth entry window, then
4. Select the desired image pixel Bit Depth to record image data, (images stored in the camera DRAM), and save image data, (images to be transferred from the cameras DRAM into the Phantom Control Unit computer).

RESULT: The image data being recorded and saved will be at the image pixel bit depth selected.

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4.2.5.1.6 Specify the Cine Memory Partitions

The MultiCine feature allows the end-user to:

- Specify the number of memory segments, or partitions, a camera's DRAM or attached Phantom CineMag's memory will be evenly divided into.
- Define a unique configuration profile for each of the memory segments.
- View how the memory segments are configured.
- Select which memory segment to capture or record image data into.
- Delete the recorded cine file, (image data), stored in a specific memory segment, without deleting recorded image data in any of the other memory segments, to free up that memory to perform another capture.

NOTE

Each memory segment, from a MultiCine recording, can have its own acquisition parameters. The MultiCine feature is not available with the Phantom v4.1, v4.2, v5.0, v6.0, or v6.1 camera models.

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Camera Settings.
3. Click the down-arrow to the right of the MultiCine>Partitions entry window, then
4. Select the number of DRAM memory segments desired.
5. In the 'Changing partitions will erase all cines from camera volatile memory, Proceed?' confirmation window:
   a. Click the OK button to partition the selected Phantom camera's DRAM, alternately
   b. Click the Cancel button to leave the selected camera's DRAM as is.

RESULT: Each partition of the selected Phantom camera's DRAM will be allocated with an equal percentage of the total memory buffer.

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4.2.5.1.7 Define the Automatic Lens Control

The Lens Control option allows the end-user to control an attached lens remotely when used with the Automatic Lens Control Mount. The end user can adjust/set:

- Aperture (f-stop)
- Focus

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Camera Settings.
3. Click the pull-down-arrow to the right of the Aperture entry field, then
4. Select the desired f-stop for the attached, lens.
5. Adjust the lens focus by:
   a. Click the +, (plus), button to focus the lens to its limit location respectively corresponding to infinity, or
   b. Click the -, (minus) button to focus to the minimum-focusing-point of the lens, alternately
   c. Slide the Lens Control Slider upward, (Fast+), to focus the lens to its limit location respectively corresponding to infinity, or
   d. Slide it downward, (Fast-) to focus to the minimum-focusing-point of the lens.

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4.2.5.2 Cine Settings

This topic describes the Step-by-Step procedures that can be performed Cine Settings selector.

4.2.5.2.1 Define the Resolution

The Resolution setting allows the user to change the dimensions, width to the height ratio, of the image to be recorded. Each type of camera has a specific maximum resolution. Changing the Resolution settings to match the dimensions of the subject of interest allows the user the option of recording at higher sample rates, or longer recording times at the same sample rate.

Using the CAR (Continuous Adjustable Resolution) feature, provides for resolution adjustments between the minimum and maximum drop-down list values as follows:

- Phantom 65 in 4096 x 8 pixel increments
- Phantom HD Gold, HD in 2048 x 8 pixel increments
- Phantom v710, v640, v310, v210, and v12 Series in 128 x 8 pixel increments
- Phantom v10 and v9.1 in 96 x 8 pixel increments
- Phantom v9.0 in 48 x 8 pixel increments
- Phantom v7.3 in 32 x 8 pixel increments
- Phantom v7.2, v7.1, v7.0, v6.2e, v4.3, and v4.2 in 16 x 8 pixel increments
- Phantom v5.1 in 64 x 4 pixel increments
- Phantom v6.0, v5.0, v4.1, and v4.0 in 8 x 8 pixel increments
- Phantom Miro eX4, Miro 4, Miro eX3, Miro 3, Miro Airborne, Miro eX2, Miro 2 in 32 x 8 pixel

NOTE

Reducing the image resolution, (width to the height ratio), will provide faster recording speeds, (Sample Rates), or longer recording times, (Duration).

The Resolution will also determine the available Sample Rates.

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Cine Settings.
3. Specify the selected Phantom camera's Resolution parameter:
   a. Click the down-arrow to the right of the Resolution entry window and select a predefined Resolution from the pull-down selection list, or
   b. To use a resolution that is not displayed within the list simply enter the desired Resolution, (width x height).

RESULT: The Phantom Camera Control application will display the closest available Resolution allowed in the Resolution entry window.

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4.2.5.2.2 Define the Sample Rate

The Sample Rate parameter specifies the rate at which images are to be recorded. The Sample Rate is depended upon the defined Resolution, (width to the height ratio), of the images being captured.

NOTE

The Sample Rates setting will determine the minimum to maximum Exposure Times available, and the range of Sample Rates available will be dependent upon the Resolution setting.

The Sample Rates listed below are typical values intended for illustrative purposes only. They are subject to wide variations in practice depending upon the specific analytical requirements and test conditions.

EVENT	TYPICAL SAMPLE RATE	EVENT	TYPICAL SAMPLE RATE
Man Walking	30fps	Cutting Action of a Dental Drill	16,000fps
Bottle-Filling Machine	60fps	Shot-Gun Pellets in Flight	32,000fps
13-Ton Punch Press	120fps	Bursting a Toy Balloon	64,000fps
Blink of an Eye	240fps	30/06 Rifle Bullet in Flight	125,000fps
Pouring of Liquid	500fps	Crack Propagation in Glass	250,000fps
Driving a Nail	1,000fps	Liquid Cavitation Phenomena	500,000fps
Wing Beat of a Honey Bee	2,000fps	High Explosive Detonation	1,000,000fps
Contact Chatter in a Switch	4,000fps	Electrical Spark Discharges	>2,000,000fps
Circular Saw Cutting Wood	8,000fps		

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Cine Settings.
3. Specify the selected Phantom camera's Sample Rate parameter:
   a. Click the down-arrow to the right of the Sample Rate entry window and select a predefined Sample Rate from the pull-down selection list, alternately
   b. To use a Sample Rate that is not displayed within the list simply enter the desired rate.

RESULT: The Phantom Camera Control application will display the closest available Sample Rate allowed in the Sample Rate entry window.

For actual Sample Rates refer to: Functional Descriptions>Frame Rate Tables.

4.2.5.2.3 Define the Exposure Time

The default setting is nominally, the reciprocal of the Sample Rate fewer than 20 microseconds of overhead.

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NOTE

The range of valid Exposure Times is dependent upon the defined Sample Rate.

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Cine Settings.
3. Specify the selected Phantom camera's Exposure Time parameter:
   a. Click the down-arrow to the right of the Exposure Time entry window and select a predefined Exposure Time from the pull-down selection list, alternately
   b. If the desired exposure time is not listed, enter the exposure time required. The Phantom Camera Control application allows the user to enter any exposure time between the minimum and maximum times displayed in the drop down list, in 1µs increments, percentage, or degrees.

      For details on changing the Exposure Time Unit to µs, degree, or percent, see, Step-by-Step Procedures>Menubar Procedures>Tool Menu Procedures>Preferences - Phantom Camera Control Preferences.

RESULT: The Phantom Camera Control application will set the Exposure Time in the Exposure Time entry window.

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4.2.5.2.4 Define an EDR, (Extreme Dynamic Range), Exposure Time

The EDR, (Extreme Dynamic Range), exposure time feature is very useful when the subject contains very bright areas as well as darker areas and both must be exposed properly throughout the cine file. The EDR function permits the end-user to expose for darker areas in the subject via the Sample Rate and Exposure time settings and then set a separate and independent pixel level EDR exposure for all the portions of the image that might become saturated, (over exposed).

NOTE

The EDR feature is automatically enabled when any value, other than zero, is entered in the EDR Exposure field, and the EDR feature cannot be used in conjunction with the Auto Exposure feature and should not be enabled while performing a CSR, (Current Session Reference), or Black Reference calibration adjustment.

EDR Exposure times should be set at approximately 1/2 of the Exposure Time as a starting point. By setting the EDR Exposure to 1/2 of the Exposure Time the brightest pixels in the images will be exposed for one stop less than the darker pixels.

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Cine Settings.
3. Specify the selected Phantom camera's EDR parameter:
   a. Click the down-arrow to the right of the EDR exposure time entry window and select a predefined EDR exposure time from the pull-down selection list, alternately
   b. Optionally the end-user can enter any number in increments of 1 from the minimum to maximum value displayed in the list box. These values can be in 1µs increments, or a percentage of the Exposure Time value.

      For details on changing the EDR Unit to µs, or percent, see, Step-by-Step Procedures>Menubar Procedures>Tool Menu Procedures>Preferences - Phantom Camera Control Preferences.

RESULT: The Phantom Camera Control application will set the EDR exposure time in the EDR entry window.

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4.2.5.2.5 Low Light

Using the Low-Light feature automatically sets the camera exposure to a pre-defined level. This exposure level is based on the camera's resolution and sample rate settings.

STEP-BY-STEP PROCEDURE

To Turn On the Low Light Feature

1. Click the Live Control Panel Tab.
2. Click on Cine Settings.
3. Click on the Low Light button.

RESULT: The Sample Rate of the camera will decrease significantly from it original setting.

To Turn Off the Low Light Feature

1. Click the Live Control Panel Tab.
2. Click on Cine Settings.
3. Click on the Undo Low Light button.

RESULT: The Sample Rate of the camera will increase back to its original user-define setting.

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4.2.5.2.6 Define a Post Trigger Value

The Post Trigger value represents how many frames will be recorded after the trigger signal has been detected by the Phantom camera. Since the memory is a scrolling memory, the Post Trigger value also sets the reciprocal number of pre-trigger images captured.

STEP-BY-STEP PROCEDURE

Determining a Post Trigger Value

To properly set a Post Trigger value you must first determine if:

1. The maximum number of images written in the cameras DRAM prior to the trigger signal being detected by the camera, (all Pre-Trigger frames), are to be saved.
   a. Set the Post Trigger to 1.
2. The maximum number of images the camera can write into DRAM after a trigger signal is detected by the camera, (all Post Trigger frames), are to be saved.
   a. Set the Post Trigger to the maximum number images for the selected camera, in other words, the maximum number of images the camera can save.

NOTE

A Phantom camera can only store a finite number of images into its' memory buffer based on the Resolution, Image Bit Depth settings, and the buffer, (amount of DRAM memory), size.

3. The Post Trigger function is to introduce a delay, continue to record for a period of time after the trigger signal has been detected by the camera, before saving the total number of images the camera's DRAM will allow.
   a. First, divide the desired delay time by the image interval time, (the image interval time is the reciprocal of the sample rate), to get a number of images.
   b. Go to Live - Advanced settings selector – Cine Advanced and check Trigger Delay. The number of post trigger frames will automatically get the maximum value.
   c. Enter the number of images derived at 3a in the text box next to Trigger Delay.

Post Trigger Application Example

The user needs to record 35 seconds of event time at a required sample rate that will only allow the camera to record 10 seconds of the event. The good news is the user has multiple cameras that he/she can network to together to record the event. The cameras are synchronized, and will be provided with the same hard trigger, so that to will be the same for all cameras.

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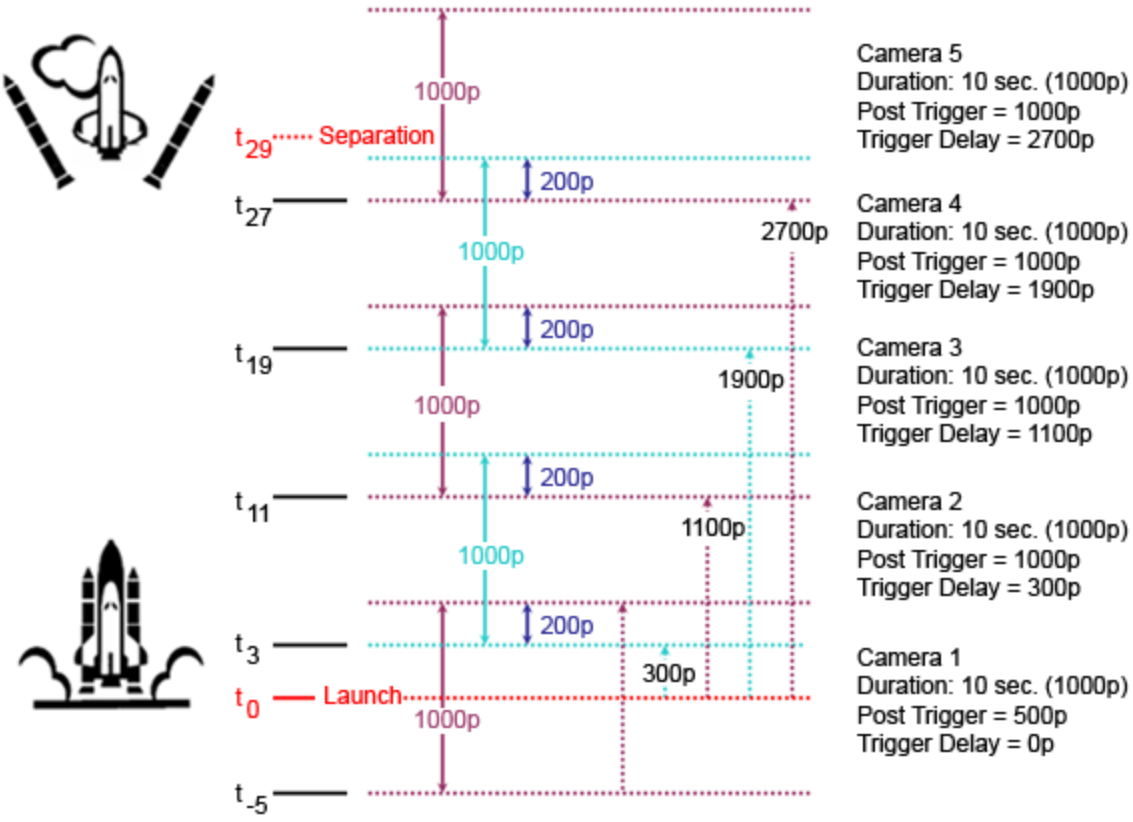

Specify the Post Trigger Value

1. Click the Live Control Panel Tab.
2. Click on Cine Settings.
3. Specify the selected Phantom camera's Post Trigger parameter:
   a. Click the down-arrow to the right of the Post Trigger entry window and select a predefined Post Trigger value from the pull-down selection list, or
   b. Slide the Trigger Position slider to the right to reduce the number of Post Trigger frames, or to the left to increase the number of Post Trigger Frames, or
   c. If the desired Post Trigger value is not listed, enter the number of Post Trigger frames required. The Phantom Camera Control application allows the end-user to enter any Post Trigger value between the minimum and the maximum value displayed in the drop down list.

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4.2.5.3 Advanced Settings

This topic describes the Step-by-Step procedures that can be performed Advanced Settings selector.

4.2.5.3.1 Define the Cine Advanced Options

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Advanced Settings.
3. Enable, check, Exposure in PIV Mode.

   This feature has been designed for use in PIV (Particle Imaging Velocimetry) applications. When enabled the Phantom v-series cameras are instructed to reduce the Frame Straddle Time to an interval of 1.5µs. For a Phantom v710, v640, v310, v210 or v12 the Frame Straddle time will be reduced to 300 nano-seconds.
4. Enable, check, Trigger Delay.

   This feature allows end-users to add a delay between the trigger command, (via Phantom Camera Control application, or hardware), and the actual recording into the camera's image buffer DRAM. After the trigger signal is detected, the Phantom camera will loop-record into DRAM the specified number of frames. The effect of this is a delay, because the frames that will actually be kept into the camera's image buffer will be the images recorded after this delay.
5. Enter the Trigger Delay value in the Trigger Delay entry window to the right of Trigger Delay enable box. The Trigger Delay value is entered as the number of pictures or images will be generated before applying the trigger signal.

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4.2.5.3.2 Define the CineMag Option

Phantom cameras that support a Phantom CineMag can operate in one of two operational mode, including:

Loop

In Loop Mode the Phantom camera stores, the recorded image data into the camera's DRAM buffer. In this mode, the Phantom CineMag operates like any other Flash card, after a cine file, (image data), is recorded into the camera's DRAM frame buffer, the end-user manually saves the image data it into the Phantom CineMag by initiating the Save to Flash command window, which can be accessed via the Cine Pull-down Menu.

NOTE

This mode supports recording up to the maximum Sample rate.

R/S (Run/Stop)

In Run/Stop Mode the image data is recorded directly into the Phantom CineMag. For example, a Phantom HD will store the image data at a rate up to 450fps at the HD resolution of 2048 x 1080.

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Advanced Settings.
3. Enable, (check), the CineMag>Direct recording to CineMag feature to write each image data directly into the attached Phantom CineMag too.

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4.2.5.3.3 Define the Start/End of Recording Actions Parameters

The End of recording actions parameters instruct the selected Phantom camera to perform various tasks immediately after the image data, or cine file, has been recorded into the camera's DRAM.

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Advanced Settings.
3. Enable, (check), **Auto Black Reference**.

   When enabled, checked, the Auto Black Reference parameter eliminates the need to cover the lens prior to performing a Current Session Reference with Phantom cameras having the Internal Automatic Mechanical Shutter option.
4. Enable, (check), **Auto Save to CineMag/Built-In Flash** to:
   a. Write the image data into a mounted Phantom CineMag, when the recording process has been completed, or
   b. Automatically write the image data, that has been recorded into it's DRAM buffer, into the selected Phantom camera’s non-volatile memory when the recording process has been completed.
5. Enable, (check), **Auto Save to HDD/CF Card** to save the recorded image data in the selected Phantom camera's DRAM to a:
   a. Specified location and file defined in the associated filename entry box, (//100.100.100.20/share/mymovie.cine), or
   b. An installed Type 1 Compact Flash Card in certain camera models, (i.e., Phantom Miro 3, Miro eX3, Miro 4, Miro eX4, or Miro Airborne camera).
6. Enable, (check), **Auto Play Video Out** to play the recorded image data, from the selected Phantom camera, to an attached analog video monitor immediately after the recording process has completed.
   a. In the Repeat field, enter the number of times the recorded cine file is to playback on the attached monitor. Entering a zero, (0), instructs the cine file to loop indefinitely when the Auto Play to Video Out feature is enabled, (checked).
   b. Enable, (check), the FullCine feature to save or play the entire range of recorded cine images, or
   c. Edit the cine images to save or play:
      1) Enter the First cine image to be used to create the cine file to be saved or viewed, then
      2) Enter the Count, or total number of cine images used to create the cine file to be saved or viewed, starting from the First image defined above.

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4.2.5.3.4 Define the External Sync Parameters

This field instructs the selected Phantom camera to utilize any one of three sync imaging clock sources.

The External Sync Parameters will vary based on how the selected Phantom camera is to be utilized, (i.e., as a standalone camera, or in a multi-camera network). The following Step-by-Step Procedures describe the setup process to use the camera in the following scenarios:

- Standalone Camera
- Using a Phantom Camera as the Master Clock Source for Serial Connected Phantom Cameras
- Using an External Clock Source to Synchronize Multiple Phantom Cameras
- Using an IRIG-B Clock Source to Synchronize Multiple Phantom Cameras

STEP-BY-STEP PROCEDURE

Standalone Camera

1. Click the Live Control Panel Tab.
2. Click on Advance Settings.
3. Click the down-arrow to the right of the Sync Imaging field, then
   a. Selected Internal as Sync Imaging clock source.

      When set to Internal the camera's internal crystal oscillator is used to drive the camera's sample rate.
4. Set the Master Camera Serial (0=none) parameter to 0, (zero).
5. Specify the desired Frame Delay:
   a. Enter the delay time required between the clock source pulse and the frame capture to provide a phase shift in the timing, or
   b. Leave this setting at its default of 1µs if no delay is to be added.

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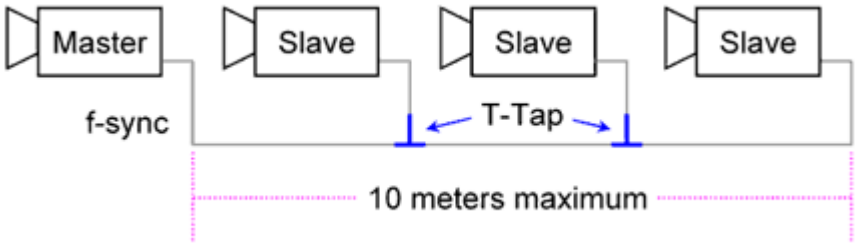
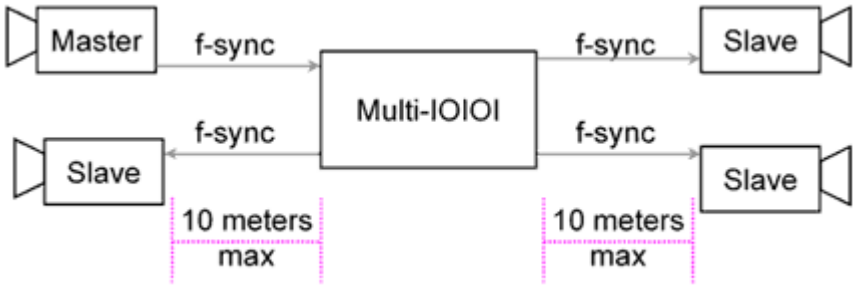
Using a Phantom Camera as the Master Clock Source for Serial Connected Phantom Cameras

The application shown below is that of the Master camera forwarding the f-sync signal, serially, to the Slave cameras.



Serial Camera Application

The application shown below is that of a Multi-IOIOI or Multi-IOIOG unit forwarding the f-sync signal from the Master camera, in parallel, to the Slave cameras.



Multi-IOIOI or Multi-IOIOG Application

CAUTION

When utilizing the f-sync feature with this application, all cameras must be supplied an external trigger. If a soft-trigger is used to trigger the cameras, Vision Research cannot guarantee that the cameras will remain synchronized.

1. Click the Live Control Panel Tab.
2. Click on Advance Settings.
3. Click the down-arrow to the right of the Sync Imaging field, then
4. Selected the Sync Imaging clock sources as follows:
   a. Internal for the master clock source Phantom camera, then
   b. External for all other slave clock source Phantom cameras.

   When set to Internal the camera's internal crystal oscillator is used to drive the camera's sample rate.

   When set to External mode the camera uses an externally supplied pulse to drive the camera's sample rate. The external input must be a TTL pulse, with a frequency up to the

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maximum sample rate for the defined resolution. The TTL input pulse must be connected to the BNC (Bayonet Neill-Concelman) connector marked Sync on the attached Capture cable or breakout box.

NOTE

When External Sync Imaging is selected the Cine Settings>Sample Rate field will be disabled.

5. Enter the 4-digit serial number of the master clock source camera in the Master Camera Serial (0=none) field.
6. Set the Frame Delay, of all slave cameras, cameras accepting the master cameras provided clock, to at least 1µs greater than that of the master camera.

NOTE

The 4-digit serial number of a camera can be found on the side of each Phantom camera.

7. Ensure the Exposure time setting, of the Externally timed cameras, does not exceed the maximum Exposure time of the master clock source camera.
8. Ensure that the Post Trigger value of the master clock source camera is set to a value that is one frame greater than the Post Trigger setting of the Externally timed cameras.

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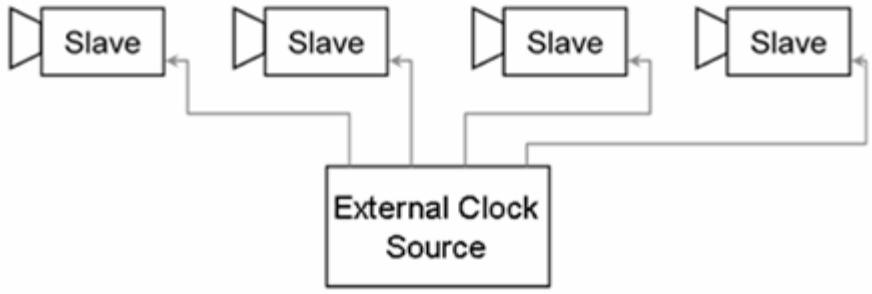
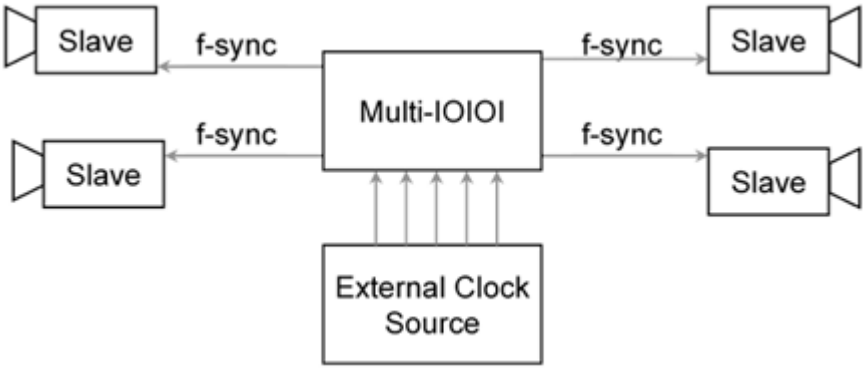
Using an External Clock Source to Synchronize Multiple Phantom Cameras

The applications shown below is that of an External f-sync signal being forwarded to each of the Phantom cameras independently.



Serial Camera Application



Multi-IOIOI or Multi-IOIOG Application

CAUTION

When utilizing the f-sync feature with this application, all cameras must be supplied an external trigger. If a soft-trigger is used to trigger the cameras, Vision Research cannot guarantee that the cameras will remain synchronized.

1. Click the Live Control Panel Tab.
2. Click on Cine Settings, then
   a. Ensure the Sample Rate setting matches the External clock rate, and the
   b. Post Trigger setting is the same for all cameras.
3. Click on Advance Settings.
4. Click the down-arrow to the right of the Sync Imaging field, then
   a. Selected External as Sync Imaging clock source.

   When set to External mode the camera uses an externally supplied pulse to drive the camera's sample rate. The external input must be a TTL pulse, with a frequency up to the maximum sample rate for the defined resolution. The TTL input pulse must be connected to the BNC (Bayonet Neill-Concelman) connector marked Sync on the attached Capture cable

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or breakout box.

5. Set the Master Camera Serial (0=none) parameter to 0, (zero) for all cameras.
6. Specify the desired Frame Delay:
   a. Enter the delay time required between the clock source pulse and the frame capture to provide a phase shift in the timing, alternatively
   b. Leave this setting at its default of 1µs if no delay is to be added.

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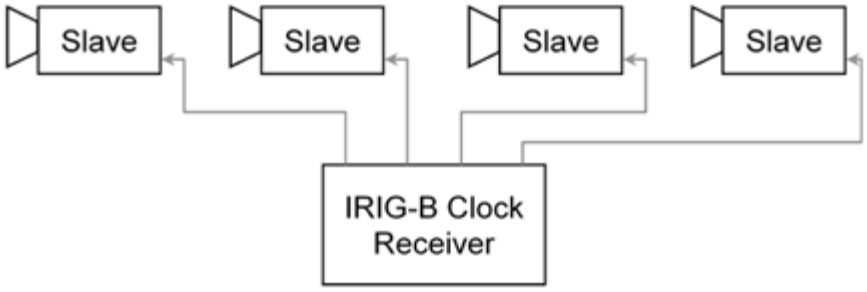
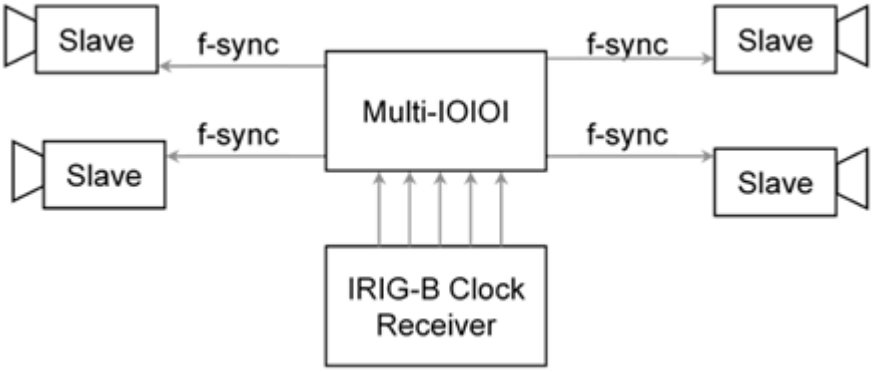
Using an IRIG-B Clock Source to Synchronize Multiple Phantom Cameras

The applications shown below is that of an IRIG-B f-sync signal being forwarded to each of the Phantom cameras independently.



Serial Camera Application



Multi-IOIOI or Multi-IOIOG Application

CAUTION

When utilizing the f-sync feature with this application, all cameras must be supplied an external trigger. If a soft-trigger is used to trigger the cameras, Vision Research cannot guarantee that the cameras will remain synchronized.

1. Click the Live Control Panel Tab.
2. Click on Cine Settings, then
   a. Ensure the Sample Rate setting matches the IRIG-B clock rate, and the
   b. Post Trigger setting is the same for all cameras.
3. Click on Advance Settings.
4. Click the down-arrow to the right of the Sync Imaging field, then
   a. Selected IRIG-B as Sync Imaging clock source.

   When set to an IRIG-B the signal is supplied through the marked IRIG-In BNC connector on the Capture cable or breakout box.

   Refer to the Functional Descriptions>Frame Rate Tables for a list of frame rates (fps) the camera will lock to.

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5. Set the Master Camera Serial (0=none) parameter to 0, (zero) for all cameras.
6. Specify the desired Frame Delay:
   a. Enter the delay time required between the clock source pulse and the frame capture to provide a phase shift in the timing, alternately
   b. Leave this setting at its default of 1µs if no delay is to be added.

4.2.5.3.5 Enable Real Time Output Parameters

To enable image data to stream from the selected camera to an attached Image[3].

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Advanced Settings, then
3. Enable Real Time Output.

4.2.5.3.6 Define the Acquisition Signals

A Phantom Camera and the Phantom Camera Control application can utilize the SAM-3 (Signal Acquisition Module-3) system to tag image frames with signal information supplied through a data acquisition unit such as the DT9802 and DT3010 Series Data Acquisition Modules. This mechanism is an extension of the time stamp storage system; these data tags are treated very much like time stamps and the event signal.

To use the SAM-3, (Signal Acquisition Module-3), system with a Phantom camera and the Phantom Camera Control application, the DT9802 or DT3010 Series Device Drivers must be loaded in the Phantom Control Unit. A Phantom Camera and the Phantom Camera Control application can utilize the SAM-3 (Signal Acquisition Module-3) system to tag image frames with signal information supplied through a data acquisition unit such as the DT9802 and DT3010 Series Data Acquisition Modules. This mechanism is an extension of the time stamp storage system; these data tags are treated very much like time stamps and the event signal.

To use the SAM-3, (Signal Acquisition Module-3), system with a Phantom camera and the Phantom Camera Control application, the DT9802 or DT3010 Series Device Drivers must be loaded in the Phantom Control Unit.

The following process only describes the steps to define the Phantom Camera Control application signal inputs, for the complete installation and setup process see, Accessories, Peripherals, and Miscellaneous Features>Sam-3, (Signal Acquisition Module-3), Installation.

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Advance Settings.
3. Click the Signals button.

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4. In the Analog and Binary Signal Acquisition dialogue window:
   a. Specify the desired Channel counts by clicking the down-arrow next to the Used:
      1) Binary entry field to specify the number of binary input signals to be used, (tagged), and/or
      2) Analog entry field to specify the number of analog input signals to be used, (tagged).

NOTE

The Available display windows, for both Binary and Analog indicate the number of channels supported.

   b. Select the desired Samples by click on the associated radial button:
      1) 1 Sample per image directs the system to capture 1 sample per image.
      2) Max samples per image directs the system to capture multiple samples to each image. This maximum number of samples is displayed in the Sample per Image field.

NOTE

The more channels being sampled the smaller the Sample per image will become. You can choose "1 Samples per image" or a "Maximum number of samples per image", which will be calculated by the Phantom Camera Control application. The maximum number of samples is determined by the frame rate and the number of channels be sampled.

   c. Define the Analog Channels, (ACh0 through ACh7 that represent the analog channel inputs connect to the data acquisition module).
      1) Enable, (check), Bipolar range to instruct the system to capture a value defined by two inputs, (positive and negative value samples), or
      2) Enable, (check), Differential inp. to instruct the system to capture a differential input.
      3) Specify a Name to define a nomenclature to channels ACh0 through ACh7, (Analog Channel 0 through Analog Channel 7), for ease of reference.
      4) Use the down-arrow next the an AnaGain, (Analog Gain), entry window to adjust the gain value in preset gains.
      5) Enter a Gain to adjust the value to the required measurement value.
      6) Specify the Unit, the measurement unit, (i.e., PSI - Pounds per Square Inch, etc.)
      7) Enter the ACh channel number, (the analog channel ACh8 through ACh32), to view its sample value. When more than 8 channels are selected, the values for AnaGain and Gain parameters of channels ACh8 through ACh32 is the same with those of ACh7.

NOTE

The Current Value information fields display the current sample value. The Parameters from ACh7 indicates the Current Value for the channel specified in the ACh field just to the left of the Parameter from ACh7 field.

   d. Define the Binary Channels, (BCh0 through BCh7 that represent the binary channel inputs connect to the data acquisition module).
      1) Specify a Name to define a nomenclature to channels BCh0 through BCh7, (Binary Channel 0 through Binary Channel 7), for ease of reference.
      2) Enter the BCh channel number, (the binary channel BCh8 (DT9802), or BCh8 through BCh14 (DT3010), to incorporate the sample value information, when more than 8 binary channels are sampling data via the data acquisition module.

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NOTE

The Value information fields display the current state of the binary signal being sampled.

e. Ensure the Board informational field indicates the correct type of board used to perform the data acquisition.

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4.2.5.3.7 Define the Trigger Settings

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Advanced Settings, then
3. Define the Trigger options:
   a. Enable, (check), Rising Edge to define the leading edge of a TTL supplied input trigger signal to trigger the camera, alternatively
   b. Enable, (check), Falling Edge to define the trailing edge of a TTL supplied input trigger signal to trigger the camera, then
   c. Enter a Filter Time value, in µs, to instruct the Phantom camera to ignore a trigger signal if it is detected before the specified Filter Time. It also specifies the length of time the trigger signal must be held in for it to be a valid trigger signal.

NOTE

The Trigger options are not available with Phantom v4.1, v5.0, or v6.0 cameras.

4.2.5.3.8 Define the Pretrigger Pin Is:

To specify if the TTL supplied input signal is to be used to toggle Memory Gate or as a pre-trigger input signal.

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Advanced Settings, then
   a. Click the Memory Gate radial button to use the shared Capture cable pin reference as the Memory Gate Input signal, alternatively
   b. Click the pre-trigger radial button to instruct the camera to use the shared Capture cable pin reference as the pre-trigger Input signal.

NOTE

The MemGate options are not available with Phantom v4.1, v5.0, or v6.0 cameras.

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4.2.5.3.9 Define the Ready Signal Ends At:

To instruct the connected-to camera when to toggle off its Ready signal:

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Advanced Settings, then
   a. Click the Trigger radial button to instruct the connected-to camera to toggle off its Ready signal the moment a trigger signal is detected by the camera.
   b. Click the Strobe radial button to instruct the connected-to camera to toggle off its Ready signal when the selected camera has completed capturing all the images to be recorded.

4.2.5.3.10 Define the Miro/Strobe Pin Is:

To specify if the signal type to be activated on the Auxiliary pin of the capture connector for a Phantom Miro 3, Miro 3.1, Miro eX4, or Miro 4 camera:

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Advanced Settings, then
   a. Click the IrigOut radial button to use the shared Capture cable pin reference as the IRIG Output signal, or
   b. Click the Strobe radial button to instruct the camera to use the shared Capture cable pin reference as the Strobe signal.

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4.2.5.3.11 Define the Starts In Option

To specify if camera will start in Idle or in Capture status:

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on Advanced Settings, then
3. Go to Starts In and check the option you want. Each time you start the camera it will get into the status you checked here.

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4.2.5.4 Define the Auto Exposure

This topic describes the Step-by-Step procedure to define the use of the Auto Exposure feature via the Auto Exposure selector.

The Auto Exposure feature is extremely useful when conditions adversely effect setting the camera's exposure to a fixed variable, such as capturing outdoors where clouds may change the light conditions. The system will automatically adjust the exposure setting using the information from a user-defined area. This defined pixel area should be the focus of interest, or the area of interest, in other words, the subject matter.

NOTE

The Auto Exposure feature cannot be used in conjunction with the EDR, (Extreme Dynamic Range), feature. Once the Auto Exposure feature is enabled EDR will automatically be disabled. Also, the Auto Exposure feature should not be enabled while performing a CSR, (Current Session Reference), or Black Reference calibration adjustment.

For a brief explanation of Black Reference), see: Functional Descriptions>Black Reference/Current Session Reference Adjustments.

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on the Auto Exposure Selector and define the Auto Exposure parameters:
   a. Enable, (check), Auto Exposure.

RESULT: The remaining Auto Exposure parameter fields become active. If the Show On Image option is enabled, (checked), a red, AutoExp rectangle will be displayed, over the image in the selected Phantom camera's Preview Panel. This rectangle will not be recorded with the image data. The Cine Settings>EDR parameter will automatically be disabled.

   b. Specify the desired Level, the average gray scale level for the specified area, to be realized by the automatic exposure process, (i.e., for an 8-bit pixel image depth a mid gray level is 128, black is 0, and saturation is 255), by either:
      1) Clicking the up/down arrows to the right of the Level entry window, alternatively
      2) Type the desired Level into the entry window.
   c. Define the area of interest Rectangle:
      1) Manually entering the XY coordinates of the Top, Left, Right, and Bottom pixels defining the Rectangle.
         a) Place the cursor over the image, to the upper left-hand corner or the area of interest, in the selected Phantom camera's Preview Panel, and note the XY: values in the Preview Panel Status Bar.
         b) Enter the X value in the Rectangle Left entry window, then
         c) Enter the Y value in the Rectangle Top entry window.
         d) Move the cursor to the lower right-hand corner or the area of interest, in the selected Phantom camera's Preview Panel, and note the XY: value in the Preview Panel Status Bar.
         e) Enter the X value in the Rectangle Right entry window, then
         f) Enter the Y value in the Rectangle Bottom entry window.
      2) Alternatively, drag a box around the area of interest.

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a) Place the cursor over the image, to the upper left-hand corner or the area of interest, in the selected Phantom camera's Preview Panel.

b) Hold down the left mouse key then

c) Drag the cursor to the lower right-hand corner or the area of interest, in the selected Phantom camera's Preview Panel, then

d) Release the mouse key.

e) Select the Auto Exposure option when the pop-up dialogue window displays.

RESULT: The Rectangle values will automatically be entered in the Top, Left, Right, and Bottom entry windows. If the Show On Image option is enabled, (checked), a red, AutoExp rectangle will be displayed, over the image in the selected camera's Preview Panel. This rectangle will not be recorded with the image data.

3) Click on the Full button to auto-expose the entire image area.

NOTE

The larger the auto-exposure area is the slower the auto exposure process becomes.

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4.2.5.5 Define the Frame Rate Profile

This topic describes the Step-by-Step procedure to define the use of the Frame Rate Profile feature via the Frame Rate Profile selector.

This Frame Rate Profile feature allows the end-user to define up to 5 different frame rates that automatically change, at specified points, during the capturing process of post trigger frames. The first profile is the profile defined under Live Control Panel>Cine Settings Selector. The remaining four profiles will be applied to Post Trigger frames only.

NOTE

This Frame Rate Profile feature is not available with all Phantom cameras, and the actual frame rate changes will only be applied to Post Trigger frames.

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on the Cine Setting selector.
   a. Set the Sample Rate to the fastest sample rate, (frame rate), the Frame Rate Profile feature will record at.
   b. Select the desired Exposure Time at the fastest Sample Rate, then
   c. Specify the number of Post Trigger frames.
   d. Set the Sample Rate to the initial recording speed.
   e. Take note of the Duration time.
3. Click on the Frame Rate Profile Selector and define the Frame Rate Profile parameters:
   1) Enter the number of Partitions, or number of profiles to be used during the capture process.

RESULT: A uniform distribution of the profile partitions, (in image count), will be generated.

   2) Select the desired header variable used to define the profile(s) by clicking on the down-arrow to display a pull-down selection list including the following options:
      a) Image # - specifies the first post trigger frame, or image number, the profile will change at.
      b) Time (s) - specifies the absolute time from the moment a trigger signal is detected.
      c) Image % - specifies a percentage of the image number from the number of post trigger frames.
      d) Time % - specifies a percentage of time from the post trigger duration.

NOTE

If the header variable is changed for the first column, the remaining values will be updated according to selected variable. Small changes can occur, because of a rounding process, when switching from, then back to Image #.

If the exposure you set is greater that the maximum available value for any of the frame rate values in the Frame Rate Profile, the program will automatically reduce that frame rate to a compatible level.

   3) Place the cursor into the first field to be edited and define the:
      a) Desired Image or Time variables the Rate, (Frame Rate/Sample Rate), is to change at,

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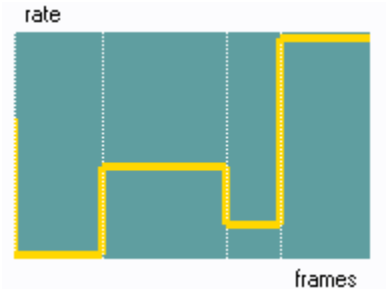
then

b) Enter the required Rate.

4) Under the Cine Settings selector, note the Duration time.

5) Repeat Steps 3, 4, and 5 until all the profiles have been defined.

RESULT: The Frame Rate Profile Graph displays the an active graphical representation of the defined profiles.



Frame Rate Profile Graph Example with 5 profiles defined

The yellow line indicates the defined frame rates for each of the profiles. The starting point of the line represents the Sample Rate set, and used by Profile 1, under Live Control Panel>Cine Settings Selector.

The white dotted lines represent the beginning of the specified Image or Time variables starting with Profile 2.

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4.2.5.6 Define the Image Content Trigger (Image-Based Auto-Trigger)

This topic describes the Step-by-Step procedure to define the use of the Image-Based Auto-Trigger feature via the Image-Based Auto-Trigger selector.

WARNING:

The Image-Based Auto-Trigger feature should never be used in applications where missed or false triggers cannot be tolerated or where a false trigger could cause harm to people or property.

The hardware signaling available in some Image-Based Auto-Trigger modes should be used only to synchronize multiple Phantom cameras together and should never be used to trigger or control any other external device or event.

CONSEQUENCES RESULTING FROM SYSTEM FAILURE, FALSE TRIGGERING OR MISUSE OF THIS FEATURE ARE THE SOLE RESPONSIBILITY OF THE USER.

The feature allows the end-user to trigger the camera from the motion detected in the live image. The camera may also provide an external trigger signal based on the Image-Based Auto-Trigger to be used for synchronizing multiple Phantom cameras. The defined pixel area should be the area of the image changes are analyzed to auto-trigger the camera.

For a brief explanation of Image-Based Auto-Trigger, see: Functional Descriptions>Image-Based Auto-Trigger.

STEP-BY-STEP PROCEDURE

NOTE

The Image-Based Auto-Trigger feature should never be enabled while performing CSR, (Current Session Reference), or Black Reference calibration adjustment.

1. Click the Live Control Panel Tab.
2. Click on the Image-Based Auto-Trigger Selector and define the Image-Based Auto-Trigger parameters:

   a. Enable, (check), Image-Based Auto-Trigger.

RESULT: The remaining Image-Based Auto-Trigger parameter fields become active. If the "Show On Image" option is enable, (checked), a yellow, ImageTrig rectangle will be displayed, over the image in the selected Phantom camera's Preview Panel. This rectangle will not be recorded with the image data.

   b. If external control of the auto-trigger is desired, for instance, it is required that the auto-trigger feature is disabled for some known transient event, and the auto-trigger signal from the camera is to be routed through some external device and back into the trigger input of the camera, enable, (check), the Only Output Signal (don't trigger this camera) option.

   c. Define the following Sensitivity parameters, including:

      1) Threshold

         The Threshold specifies the amount a pixel value must change in order to be counted as an active pixel for auto-trigger purposes. A value of 100 would require a change of approximately half of the full swing of the camera. A typical threshold setting would be 10.

         a) Click the up/down arrows to the right of the Threshold entry window to specify the Threshold value, alternatively

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b) Slide the Threshold slider to the right to increase the Threshold, or to the left to reduce the Threshold.

2) Area %

The Area % specifies the percentage of the auto-trigger region that must be active in order for an auto-trigger event to be generated. A typical percentage value is 10.

a) Click the up/down arrows to the right of the Area % entry window to specify the Area % value, or

b) Slide the Area % slider to the right to increase the Area %, or to the left to reduce the Area %.

3) Check Interval (ms)

The Check Interval (ms) parameter specifies the speed between updates the auto-trigger region is checked.

a) Click the up/down arrows to the right of the Check Interval (ms) entry window to specify the Check Interval (ms) value, alternatively

b) Slide the Check Interval (ms) slider to the right to increase the Check Interval (ms), or to the left to reduce the Check Interval (ms).

d. Define the Image-Based Auto-Trigger Area by:

1) Manually entering the XY coordinates of the Top, Left, Right, and Bottom pixels defining the Area.

a) Place the cursor over the image, to the upper left-hand corner or the area of interest, in the selected Phantom camera's Preview Panel, and note the XY: values in the Preview Panel Status Bar.

b) Enter the X value in the Area Left entry window, then

c) Enter the Y value in the Area Top entry window.

d) Move the cursor to the lower right-hand corner or the area of interest, in the selected Phantom camera's Preview Panel, and note the XY: value in the Preview Panel Status Bar.

e) Enter the X value in the Area Right entry window, then

f) Enter the Y value in the Area Bottom entry window.

2) Dragging a box around the Image-Based Auto-Trigger Area.

a) Place the cursor over the image, to the upper left-hand corner or the Area, in the selected Phantom camera's Preview Panel.

b) Hold down the left mouse key, then

c) Drag the cursor to the lower right-hand corner or the Area, in the selected Phantom camera's Preview Panel, then

d) Release the mouse key.

e) Select the Auto Trigger option when the pop-up dialogue window displays.

RESULT: The Area values will automatically be entered in the Top, Left, Right, and Bottom entry windows. If the Show On Image option is enabled, (checked), a yellow, ImageTrig rectangle will be displayed, over the image in the selected Phantom camera's Preview Panel. This rectangle will not be recorded with the image data.

3) Click on the Full button to select the entire image area.

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4.2.5.7 Define the Continuous Recording Parameters

This topic describes the Step-by-Step procedure to define the use of Continuous Recording via the Continuous Recording selector.

STEP-BY-STEP PROCEDURES

Auto Trigger

When the Auto Trigger option is enabled the system will automatically save the capture cine to the specified destination, (Cine file path and save parameters). Once the cine is saved the camera will automatically return to the capture mode, refill the camera's memory buffer then automatically triggers itself, edit and save the new cine to the user specified destination. This process will continue until you disable, (uncheck), the Active enable box.

CAUTION

Before using Continuous Recording you must first set all desired operating parameters in the Live Control Panel.

1. Click the Live Control Panel Tab.
2. Click on the Continuous Recording Selector and define the Continuous Recording parameters:

   a. Click on the Browse... button.

RESULT: The Save Cine dialogue window opens.

   b. In the Save Cine dialogue window:

      1) Navigate to the Window folder the recorded cines are to be saved into.

      2) In the File Name field type in the <root_file_name><special_character><single_digit_range>, where <root_file_name> is the root filename portion of the file or file being created. This root file name portion of the filename will remain the consistent with all files created during the Continuous Recording session. The <special character> portion of the filename is determined by the type of file or files being created. The <single_digit_range> portion of the file name specifies the number of digits or file counters that will be appended to the end of the root file name.

         For details on the Phantom File Naming Convention see; Functional Descriptions>Phantom File Naming Convention.

      3) Select the desired file type from Save As Type drop-down list. It is possible to save the captured images in any of the available formats found in the Save as type pull-down selection list. This includes saving the captured images in various Cine formats, an AVI, Multipage TIFF, MXF, or QuickTime format, or even a series of any one of a host of image formats.

         To determine the file format that best meets your requirements see, Functional Descriptions>Supported File Formats.

      4) Specify which images will constitute the saved file by defining the Range of Images to Save fields:

         a) If you do not wish to edit the file, check, (enable), the No Range (full cine always) enable box.

         b) If you wish to edit the number of images, eliminating unwanted captured images

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from the final product, and reduce the file size being saved:

i. Disable, uncheck, the No range (full cine always) enable box.

ii. Specify the First image, from the Range of images to save, then

iii. Enter the Image count, or the number of images from the First image to be saved.

5) Specify any desired available Save Options; 16bpp, Advanced Options..., XML header file, etc.

6) Click the Save button.

c. Check, enable, the Auto Trigger enable box.

d. Check, enable the Active enable box.

RESULT: Immediately, after the Active enable box is checked the camera will automatically start saving the cine(s) to the destination folder specified, place the camera back into the "Capture" mode, store the new images into the cameras DRAM until it fills the memory buffer one time, then automatically trigger the camera, edit and save the newly recorded cine.

e. To stop the Continuous Recording Auto Trigger process, disable, (uncheck) the Active and Auto Trigger enable boxes.

Once Only (Manual Capture Restart)

When the Once Only (Manual Capture Restart) option is enabled the system will automatically save the capture cine file to the specified destination, (Cine file path and save parameters), and place the camera into the "Preview" mode once the trigger signal is detected by the camera. In order for the camera to record and save a second cine file you must place the camera back into the Capture mode, and apply a trigger signal.

Before using Continuous Recording you must first set all desired operating parameters in the Live Control Panel.

1. Click the Live Control Panel Tab.
2. Click on the Continuous Recording Selector and define the Continuous Recording parameters:

a. Click on the Browse... button.

RESULT: The Save Cine dialogue window opens.

b. In the Save Cine dialogue window:

1) Navigate to the Window folder the recorded cines are to be saved into.

2) In the File Name field type in the <root_file_name><special_character><single_digit_range>, where <root_file_name> is the root filename portion of the file or file being created. This root file name portion of the filename will remain the consistent with all files created during the Continuous Recording session. The <special character> portion of the filename is determined by the type of file or files being created. The <single_digit_range> portion of the file name specifies the number of digits or file counters that will be appended to the end of the root file name.

For details on the Phantom File Naming Convention see; Functional Descriptions>Phantom File Naming Convention.

3) Select the desired file type from Save As Type drop-down list. It is possible to save the captured images in any of the available formats found in the Save as type pull-down selection list. This includes saving the captured images in various Cine formats, an

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AVI, Multipage TIFF, MXF, or QuickTime format, or even a series of any one of a host of image formats.

To determine the file format that best meets your requirements see, Functional Descriptions>Supported File Formats.

4) Specify which images will constitute the saved file by defining the Range of Images to Save fields:

a) If you do not wish to edit the file, check, (enable), the No Range (full cine always) enable box.

b) If you wish to edit the number of images, eliminating unwanted captured images from the final product, and reduce the file size being saved:

i. Disable, uncheck, the No range (full cine always) enable box.

i. Specify the First image, from the Range of images to save, then

ii. Enter the Image count, or the number of images from the First image to be saved.

5) Specify any desired available Save Options; 16bpp, Advanced Options..., XML header file, etc.

6) Click the Save button.

c. Check, enable, the Once only (Manual capture restart) enable box.

d. Check, enable the Active enable box.

RESULT: Immediately, after the Active enable box is checked the camera will be placed into the Capture mode.

e. Apply a trigger to the camera.

RESULT: The camera will edit and save the recorded cine to the user specified destination folder, and the Active enable box will disable, uncheck itself automatically.

3. Check, enable, the Active enable box to record, edit and save subsequent cines to the specified destination.
4. When finished uncheck, disable the Once only (Manual capture restart) enable box.

Waiting for Trigger

When the Once Only (Manual Capture Restart), and AutoTrigger options are not enabled the system will automatically save the capture cine file or files to the specified destinations, (Cine file path and save parameters), and place the camera into the "Preview, Recording Cine n ... Waiting for Trigger" mode once the trigger signal is detected by the camera. To record and save a second cine file the camera simply needs to detect a trigger signal.

Before using Continuous Recording you must first set all desired operating parameters in the Live Control Panel.

1. Click the Live Control Panel Tab.
2. Click on the Continuous Recording Selector and define the Continuous Recording parameters:

a. Click on the Browse... button.

RESULT: The Save Cine dialogue window opens.

b. In the Save Cine dialogue window:

1) Navigate to the Window folder the recorded cines are to be saved into.

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2) In the File Name field type in the <root_file_name><special_character><single_digit_range>, where <root_file_name> is the root filename portion of the file or file being created. This root file name portion of the filename will remain the consistent with all files created during the Continuous Recording session. The <special character> portion of the filename is determined by the type of file or files being created. The <single_digit_range> portion of the file name specifies the number of digits or file counters that will be appended to the end of the root file name.

   For details on the Phantom File Naming Convention see; Functional Descriptions>Phantom File Naming Convention.

3) Select the desired file type from Save As Type drop-down list. It is possible to save the captured images in any of the available formats found in the Save as type pull-down selection list. This includes saving the captured images in various Cine formats, an AVI, Multipage TIFF, MXF, or QuickTime format, or even a series of any one of a host of image formats.

   To determine the file format that best meets your requirements see, Functional Descriptions>Supported File Formats.

4) Specify which images will constitute the saved file by defining the Range of Images to Save fields:

   a) If you do not wish to edit the file, check, (enable), the No Range (full cine always) enable box.

   b) If you wish to edit the number of images, eliminating unwanted captured images from the final product, and reduce the file size being saved:

      i. Disable, uncheck, the No range (full cine always) enable box.

      ii. Specify the First image, from the Range of images to save, then

      iii. Enter the Image count, or the number of images from the First image to be saved.

5) Specify any desired available Save Options; 16bpp, Advanced Options..., XML header file, etc.

6) Click the Save button.

c. Check, enable the Active enable box.

RESULT: Immediately, after the Active enable box is checked the camera will be placed into the Capture mode.

d. Apply a trigger to the camera.

RESULT: The camera will edit and save the recorded cine to the user specified destination folder, and place the camera back into the Capture mode.

3. To record, edit, and save subsequent cines, apply a trigger to the camera.
4. When finished uncheck, disable the Active enable box.

Verify Continuous Recording Session

1. When the Continuous Recording session is complete:

   a. Click on the Open File icon.

   b. Navigate to the destination folder, then

   c. Verify the file listings.

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Removing the Cine File Paths and Save Parameters

1. Click the Browse... button.
2. Click the Cancel button in the Save Cine dialogue window.

4.2.5.8 Capture or Record Image Data

This topic describes the Step-by-Step procedure to place the selected Phantom into the Capture state via the Live Control Panel>Capture, or Record button.

By default Vision Research initially sets all Phantom cameras to start in the Live, or Preview... Waiting for Pre-Trigger operational state. What this means is that the camera is capturing live image data and transmitting that image data to an attached Phantom Control Unit or attached monitor only. The image data is not being recorded into the camera's DRAM. The camera waits until a command or pre-trigger signal, instructing it to start recording to its' DRAM image memory buffer, is received.

The end-user can determine that the camera is in this Live state by looking at the selected camera's Preview Panel Status Bar and see that only the Live indicator is active, blue, and the Capture or Record button is active while the Trigger button is inactive.

To place the selected Phantom camera into the Capture state via the Live Control Panel>Capture button:

STEP-BY-STEP PROCEDURE

1. Click the Live Control Panel Tab.
2. Click on the Capture button.

RESULT: The selected Phantom camera starts recording captured image data into the cameras' DRAM., and the Rec indicator, located in the Status Bar of the Preview Panel will be active, red, along with the Trigger button. Capture button will become Abort Recording.

If the camera has been set in Direct recording to CineMag (or Run/Stop mode) via Live panel>Advanced Settings, the selected Phantom camera starts recording captured image data into the cameras' DRAM and into the attached CineMag., and the Rec indicator, located in the Status Bar of the Preview Panel will be active, red. However, since there is no Trigger button the Record button changes into a Stop Recording button.

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4.2.5.9 Trigger or Abort Recording

Triggering a camera can be accomplished either by applying a "soft" trigger or "hard" trigger to the camera. Upon detection of the Trigger signal the camera will stop recording images into the cameras DRAM immediately, unless otherwise configured to capture a user specified number of Post Trigger frames.

This procedure describes how to provide a "soft-trigger" to the camera using the Phantom Camera Control application.

STEP-BY-STEP PROCESS

1. Click the Live Control Panel Tab.
2. Click on the Trigger button.

RESULT: The selected Phantom camera stops recording image data into the cameras' memory once the user specified Post Trigger value has been satisfied. The Rec indicator, located in the Status Bar of the Preview Panel, becomes inactive, gray, upon completion of the capture process.

NOTE

The Trigger button will only be active if the camera is in the Waiting for trigger state.

3. Click Abort Recording if you want to cancel recording.

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4.2.6 Play Control Panel Procedures

This section describes the Step-by-Step procedures that can be performed via the Play Control Panel.

4.2.6.1 Cine Selection

The Cine: field displays a list of the cine files, that the end-user can select to review, edit, and/or save. The list contains all the cine files listed under the:

- Cameras Group Tree, which contains a list of connected or previously connected Phantom cameras. A list of cine files will also be displayed under any connected Phantom camera that has a cine file stored in the DRAM of the camera.
- Files Group Tree, which contains a list of all open and previously opened cine files.

STEP-BY-STEP PROCEDURE

1. Click the Play Control Panel Tab.
2. Click on the down-arrow to the right of the Cine: field, then
3. Select the cine file, from the pull-down list, to open it in its own Playback Panel.

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4.2.6.2 Select the Playback Mode

The Mode button, under the Play Control Panel Tab is used to specify how the cine file is to be reviewed. Below are the steps to define the playback mode:

STEP-BY-STEP PROCEDURE

1. Click the Play Control Panel Tab.
2. Click on the down-arrow to the right of the Cine: field, then
3. Select the cine file, from the pull-down list, to open it in its own Playback Panel.
4. Click on the Mode button, then
5. Select the desired mode, or modes, from the pull-down selection list, including:
   a. Limit to Range

      When selected, (checked), Limit to Range forces the playback controls to play only the images between the Mark-In and Mark-Out entry points specified by the end-user.

   b. Repeat

      When selected, (checked), repeat will allow the cine file to be played in an endless loop. If the Limit to Range command is also selected, (checked), the loop will be limited to the range specified by the end-user during the edit cine process.

   c. Ping Pong

      Ping Pong instructs the software to play the selected cine file forward and then backward repeatedly when enabled, (checked).

RESULT: The pull-down list will close. However, a check mark will be placed to the left of the selected mode indicating that the selected playback mode has been enabled.

NOTE

The software allows for multiple playback modes to be selected at the same time.

6. Enable, (check), the Play Each Image command to instruct the Phantom Camera Control application to display every frame, (image), in the cine file, and restrict the playback rate. Disable, (uncheck) the Play Each Image command to instruct the Phantom Camera Control application to allow faster playback speeds, which may require the playback of some images to be skipped depending on the speed specified. You can use the vertical slider to set the playback speed.

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4.2.6.3 Reviewing Cine File

The Phantom Camera Control application uses common video button to play, stop or pause playback of recorded image data, from a Phantom camera's DRAM, non-volatile Flash or mounted Phantom CineMag, or a saved cine file stored on an external hard-drive as follows:

STEP-BY-STEP PROCEDURE

1. Click the Play Control Panel Tab.
2. Click on the down-arrow to the right of the Cine: field.
3. Select the cine file, from the pull-down list, to open it in its own Playback Panel.
4. Click on the Mode button, then
5. Select the desired mode, or modes, from the pull-down selection list, including:
   a. Limit to Range

      When selected, (checked), Limit to Range forces the playback controls to play only the images between the Mark-In and Mark-Out entry points specified by the end-user.

   b. Repeat

      When selected, (checked), repeat will allow the cine file to be played in an endless loop. If the Limit to Range command is also selected, (checked), the loop will be limited to the range specified by the end-user during the edit cine process.

   c. Ping Pong

      Ping Pong instructs the software to play the selected cine file forward and then backward repeatedly when enabled, (checked).

RESULT: The pull-down list will close. However, a check mark will be placed to the left of the selected mode indicating that the selected playback mode has been enabled.

6. Enable, (check), the Play Each Image command to instruct the Phantom Camera Control application to display every frame, (image), in the cine file, and restrict the playback rate. Disable, (uncheck), the Play Each Image command to instruct the Phantom Camera Control application to allow faster playback speeds, which may require the playback of some images to be skipped depending on the speed specified.
7. Move the Playback Slider up to increase the playback speed, or down to reduce the playback speed, or type the fps, (frame per second), playback rate desired in the fps entry window, and hit the Enter key.
8. Click the:

   a. Play Fast Reverse button to decrement the images being reviewed.

RESULT: The cine file will play backwards the total number of cine frames/1000, no less than 10 frames, auto adjusting to cine size.

   b. Play Fast Forward button to increment the images being reviewed.

RESULT: The cine file will play forward the total number of cine frames/1000, no less than 10 frames, auto adjusting to cine size.

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c. Standard Play Reverse button to play the cine file in reverse.

RESULT: The cine file will play backwards one image at a time.

d. Standard Play Forward button to play the cine file.

RESULT: The cine file will play forward one image at a time.

e. Pause Playback button to stop or pause the playback process.

RESULT: The playback process is halted.

f. Play Single Frame Reverse button to rewind only one image.

RESULT: The cine file will move backward one image and stop.

g. Play Single Frame Forward button to advance forward one image only.

RESULT: The cine file will move forward one image and stop.

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4.2.6.4 Perform a Quick Search Through a Cine File

Performing a Quick Search through a cine file will greatly reduce post-production time when editing a cine file. There are several methods to perform a Quick Search through a cine file.

Before we describe the procedure for each of these methods let's review the components that make up the editor bar.

The blue portion of the line, in the cine editor bar, represents the edited cine file. The number displayed at the left end of the cine editor bar refers to the first image in the entire cine sequence. The number at the right end of the bar refers to the last image in the entire cine sequence. The number just above the editor bar, in the center of the bar, indicates the number of the image presently being displayed in the playback panel. The numbers below the editor bar indicate the first and last image numbers of the edited cine file, respectively. Zero represents the first image after the moment of trigger was detected by the camera regardless of what sample rate or resolution settings were set to in the Live Control Panel. Negative numbers represent pre-trigger frames and positive numbers represent post trigger frames.

The following describes each of the methods, including:

STEP-BY-STEP PROCEDURE

Using the Edit Bar

1. Click the Play Control Panel Tab.
2. Click on the down-arrow to the right of the Cine: field.
3. Select the cine file, from the pull-down list, to open it in its own Playback Panel.
4. Click anywhere on the Cine Editor Bar. Each click will create a jump to that image of the recorded cine, alternatively
5. Place the cursor over the Cine Editor Bar Slider:
   a. Hold down the left-mouse key, and simultaneously
   b. Drag the mouse to the left, or right to the desired location.

RESULT: The slider moves to the point, or image, specified. The number just above the editor bar, in the center of the bar, indicates the number of the image the slider is at, and is presently being displayed in the playback panel.

Using the Playback Slider

1. Click the Play Control Panel Tab.
2. Click on the down-arrow to the right of the Cine: field.
3. Select the cine file, from the pull-down list, to open in its own Playback Panel.
4. Disable, (uncheck), the Play Each Image option.

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5. Click the Play Forward button.
6. Move the Playback Slider up to increase the playback speed, or down to reduce the playback speed, alternatively
7. Type the fps, (frame per second), playback rate desired in the fps entry window, then
8. Hit the Enter key.
9. Click the Pause/Stop Playback button when the desired point, or image has been reached.

RESULT: The slider moves to the point, or image, specified. The number just above the editor bar, in the center of the bar, indicates the number of the image the slider is at, and is presently being displayed in the playback panel.

Using the Jump: Field

1. Click the Play Control Panel Tab.

1. Click on the down-arrow to the right of the Cine: field.
2. Select the cine file, from the pull-down list, to open in its own Playback Panel.
3. Type an image number into the Jump: entry window, then

2. Click the Stop/Pause Playback button to jump to the specified image, alternatively

3. Hit the Enter key to jump to the specified image.

RESULT: The slider moves to the point, or image, specified. The number just above the editor bar, in the center of the bar, indicates the number of the image the slider is at, and is presently being displayed in the playback panel.

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4.2.6.5 Edit a Cine File

Many recorded cine files contain a lot of unnecessary information both before and after the actual motion of interest. The cine editor Bar is used to edit unnecessary images from the beginning and the end of the recorded cine file prior to saving the cine file to an external hard drive. Editing the cine file will create smaller files, reduce file save times, and make cine file playbacks more interesting.

STEP-BY-STEP PROCEDURE

Initial Edit

1. Select the cine file to be edited.
   a. Click the Play Control Panel Tab.
   b. Click on the down-arrow to the right of the Cine: field, then
   c. Select the cine file, from the pull-down list, to open it in its own Playback Panel.
2. Edit the cine file.
   a. In the Play Control Panel:
      1) Advance the cine file to the first image you desire to save for the cine clip via the Playback buttons, by performing a Quick Search or by entering the image number you want to go to in the Jump field, then
      2) Press the Pause button.

RESULT: The edit bar slider moves to the specified image.

3) Click the Mark In button.

RESULT: To the left of the specified image, the editor bar will turn gray, indicating that the gray area of the cine file has been edited.

4) Advance the cine file forward until you reach the last image of the cine file you wish to save in the clip, then
5) Press the Pause button.

RESULT: The edit bar slider moves to the specified image.

6) Click the Mark Out button.

RESULT: To the right of the specified image, the editor bar will turn gray, indicating that the gray area of the cine file has been edited. An image number will also be displayed below the editor bar image point indicator.

NOTE

The blue portion of the line, in the cine editor bar, represents the edited cine file. The number displayed at the left end of the cine editor bar refers to the first image in the entire cine sequence. The number at the right end of the bar refers to the last image in the entire cine sequence. The number just above the editor bar, in the center of the bar, indicates the number of the image presently being displayed in the playback panel. The numbers below the editor bar indicate the first and last image numbers of the edited cine file, respectively. Zero represents the first image after the moment of trigger was detected by the camera regardless of what sample rate or resolution settings were set to in the Live Control Panel.

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Negative numbers represent pre-trigger frames and positive numbers represent post trigger frames.

Review the Edited Cine File

1. Click on the Mode button, then
2. Select the Limit to Range mode.

   When selected, (checked), the Limit to Range option forces the playback controls to play only the images between the Mark-In and Mark-Out entry points specified by the end-user.

RESULT: The pull-down list will close. However, a check mark will be placed to the left of the selected mode indicating that the selected playback mode has been enabled.

3. Enable, (check), the Play Each Image command to instruct the Phantom Camera Control application to display every frame, (image), in the cine file, and restrict the playback rate. Disable, (uncheck), the Play Each Image command to instruct the Phantom Camera Control application to allow faster playback speeds, which may require the playback of some images to be skipped depending on the specified speed.
4. Click the Rewind button.

RESULT: The first image of the edited cine will be displayed.

5. Play the edited cine file using the playback buttons.
6. Save the edited cine file if the edit is correct, if not re-edit the cine file.

Re-Editing the Cine File

If you need to re-edit the cine file:

1. Click on the Mode button, then
2. Disable, (uncheck), the Limit to Range option.
3. Click the Rewind button.
4. Advance the cine file to the first image you desire to save for the cine clip via the Playback buttons, by performing a Quick Search or by entering the image number you want to go to in the Jump field, then
5. Press the Pause button.

RESULT: The edit bar slider moves to the specified image.

6. Click the Mark In button.

RESULT: To the left of the specified image, the editor bar will turn gray, indicating that the gray area of the cine file has been edited.

7. Advance the cine file forward until you reach the last image of the cine file you wish to save in

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the clip, then

8. Press the Pause button.

RESULT: The edit bar slider moves to the specified image.

9. Click the Mark Out button.

RESULT: To the right of the specified image, the editor bar will turn gray, indicating that the gray area of the cine file has been edited.

10. Review the newly edited file.

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4.2.6.6 Save a Cine File

The Save Cine.. button is used to save the selected cine file, manually save the cine file to Flash memory see: Step-by-Step Procedures>Menubar Procedures>Saving a Cine File to Flash Memory, save multiple cine files, stored in the selected Phantom camera's DRAM, (MultiCine), see: Step-by-Step Procedures>Menubar Procedures>Saving All RAM to File, (MultiCine), or save and select multiple cine files from multiple cameras, see: Step-by-Step Procedures>Select&Save Cines to File.

The following steps are used to save the captured cine file(s) that has been recorded into the camera's memory buffer to your system hard drive, a networked drive, or to some peripheral device.

STEP-BY-STEP PROCEDURE

1. Select the cine file to be saved.
   a. Click the Play Control Panel Tab.
   b. Click on the down-arrow to the right of the Cine: field, then
   c. Select the cine file, from the pull-down list, to open it in its own Playback Panel.
   d. Edit the cine. See Step-by-Step Procedures>Play Control Panel Procedures>Edit a Cine File. The range of the edited cine (images between Mark In and Mark Out) will be used in Save cine window to get the first image and image count values.
2. Click the Save Cine.. button to save the selected cine file, alternatively
3. Click the down-arrow in the Cine button, and select the save method desired from the pop-up selection list.

For details on each of these methods refer to: Step-by-Step Procedures>Cine Menu Procedures...

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4.2.6.7 View Frame Info

Selecting the Frame Info selector displays the timing information about the image or frame being viewed.

STEP-BY-STEP PROCEDURE

1. Click the Play Control Panel Tab, and select the cine.
2. Click on the Frame Info selector.

   For a brief description of the Frame Info fields, see: The User Interface>The Control Panels>Play Control Panel Components>Frame Info Selector.

4.2.6.8 View Cine Info

Selecting the Cine Info selector displays all the setup parameters for the cine being viewed.

STEP-BY-STEP PROCEDURE

1. Click the Play Control Panel Tab, and select the cine.
2. Click on the Cine Info selector.

   For a brief description of the Cine Info fields, see: The User Interface>The Control Panels>Play Control Panel Components>Cine Info Selector.

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4.2.6.9 View SAM-3 Signaling

The Phantom Miro3, Miro 3.1, Miro eX4, Miro4, v5.1, v7 series, v9 series, v10, v12 series, v210, v310, v640, and v710 cameras all provide the ability to gather analog signal information, binary signal information, or both from one of two Data Translation Data Acquisition Unit models, (the DT-3010 or DT9802). The gathered signal information is translated and stored for each image and can be displayed with the captured images during playback.

For details on SAM-3 installation and use, see: Accessories, Peripherals, and Miscellaneous Features>SAM-3 (Signal Acquisition Module-3), Installations.

STEP-BY-STEP PROCEDURE

Viewing the Sampled Signal Acquisition Information

1. Click on the Play Control Tab, select the cine, and click the Frame Info selector.
2. Click the Signals.. button.

   The Signal Display dialogue window indicates the number of:

   - Binary and Analog Channels sampled.
   - Samples per channel captures for each image.
   - Images captured.

3. View the Signal information using any of the following methods:

   a. Clicking on a specific Binary or Analog Signal button to view only that channels sampled information in a window display.

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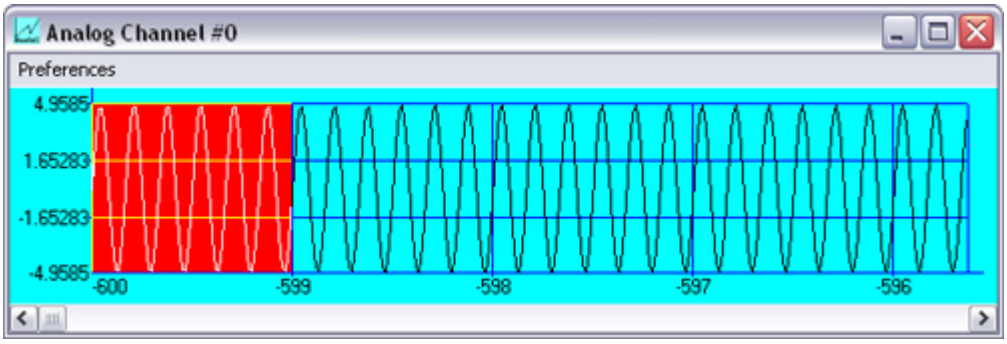
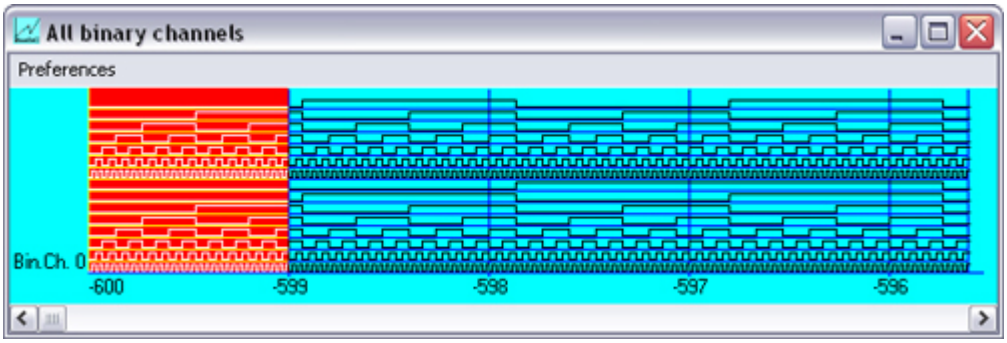
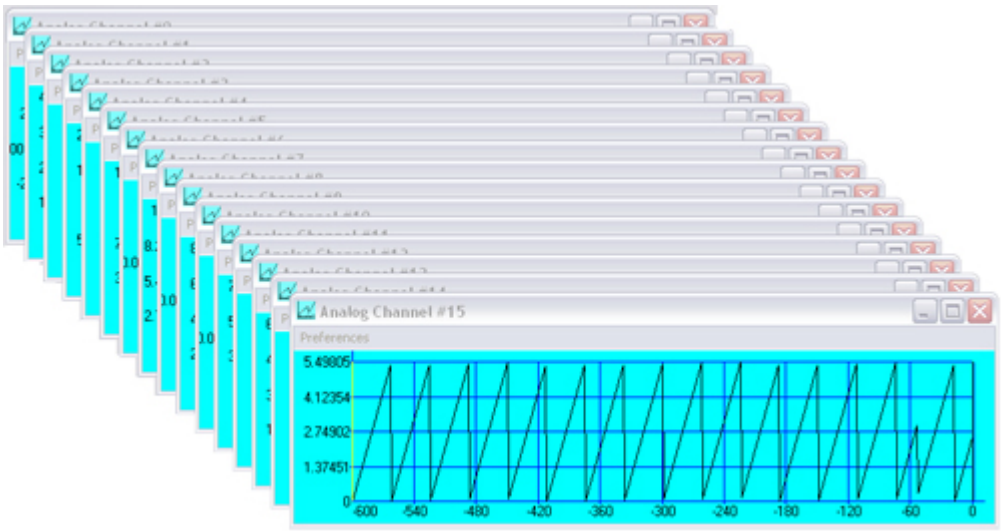


b. Clicking the All binary, 1 window button or All analog, 1 button to view all the binary or analog channels information sampled in a single display window.



c. Clicking the All binary or All analog buttons to view all the binary or analog channels information sampled in their own display window.



4. Once all the desired sample information display windows have been opened and viewed, click the Close button.

Understanding the Signal Acquisition Channel Display

The display window is a graphical representation of the sampled signal information as shown

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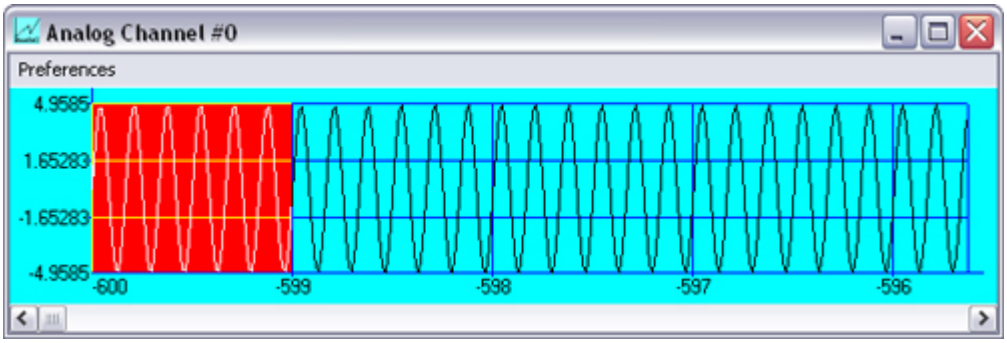
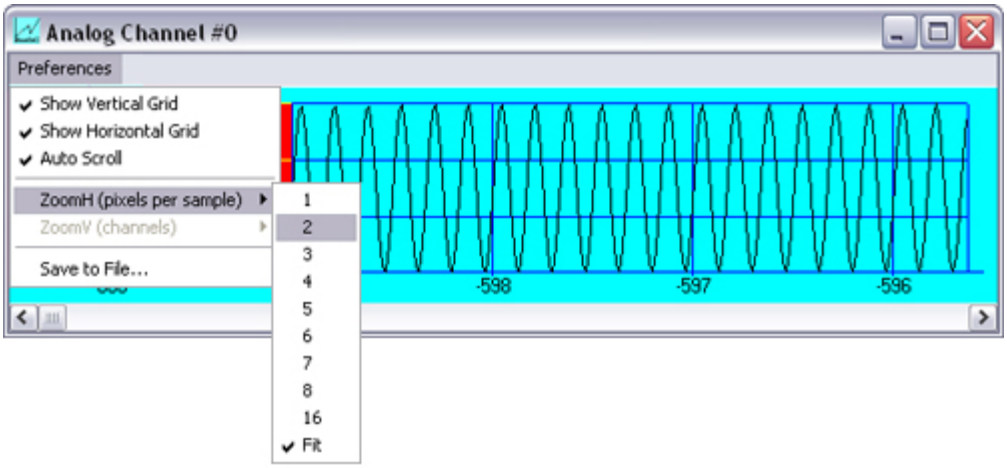
below.



Example of a sampled 20Hz sine wave.

The Preferences pull-down menu allows the user to:



Show Vertical Grid

Show Vertical Grid allows the end-user to select if a vertical grid should be displayed in the channels sampled information graph. The vertical blue lines represent the mark between the capture images. The number of samples per image is defined in the Signal dialogue window.

Show Horizontal Grid

Show Horizontal Grid allows the end-user to select if a horizontal grid should be displayed in the channels sampled information graph.

Auto Scroll

Auto Scroll allows the end-user to enable/disable the Auto Scroll feature. When this option is enabled, (default), a reference, (red), line scrolls across the signal.

ZoomH (pixels per sample)

This option allows the end-user to zoom in on the signals to view the values associated with each sample, on a per-image basis, easily.

ZoomV (channels)

This option allows the end-user to zoom in on a specified number binary channels to view the values associated with each sample, on a per-image basis, easily.

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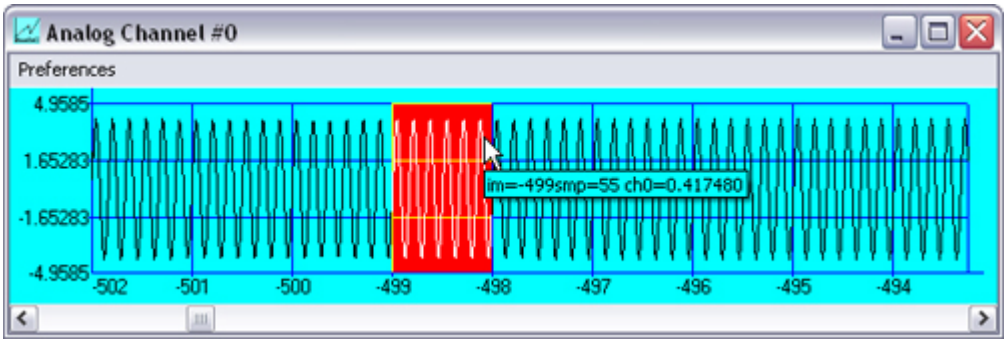
Placing the cursor over a specific point of an analog sample will display the following information:



im (image)

This option indicates the image number the specified reference point of the signal is associated with.

smp (sample)

This option indicates the sample number the specified reference point for the associated image.

ch (number)

This option indicates the associated value of the reference point. This value will depend on what the signal represents.

4.2.6.10 Specify the Time Translation

This pull-down selection list window specifies how the time information is to be displayed. The user can specify if the time information is to be displayed using the local time zone or UTC, (Universal Time Code), formally referred to as GMT, (Greenwich Means Time).

STEP-BY-STEP PROCEDURE

1. Click the Play Control Panel Tab.
2. Select the cine and click on Frame Info selector.
3. Check the desired Time Translation.

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Part V

5 Phantom CineMag - Help

Updated: 3/18/2010

This module describes the most common tasks you will use when working with a Phantom CineMag attached to a Phantom 65, Phantom HD, Phantom v710, v640, v310, v210, or Phantom v12.1 imaging system. It is designed as a "How-To" guide. Although it is organized roughly in the order that one would perform the tasks one don't need to begin at the beginning and work their way through.

The topics in this section are intentionally kept as brief as possible. The focus is on how to do capture, view, edit and save cine files using a Phantom CineMag.

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5.1 Defining the Operational Mode

Phantom cameras that support a Phantom CineMag can operate in one of two operational mode, including:

Loop

In the Loop Mode, the camera stores the recorded image data into the camera's DRAM buffer. In this mode, the Phantom CineMag operates like any other Flash card, after a cine file is recorded into the camera's DRAM frame buffer, you can manually save it into the CineMag using the "Flash Memory" dialogue window which can be accessed in either the Setup and Recording or ViewCine dialogue windows.

NOTE

This mode supports recording up to the maximum frame rate.

R/S (Run/Stop)

In Run/Stop Mode the image data is recorded, for a Phantom HD up to 450fps at HD resolution (2048 x 1080), directly into the Phantom CineMag.

STEP-BY-STEP PROCESSES

Via the Phantom (PCC) Camera Control Application

1. Start the Phantom (PCC) Camera Control Application.
2. Select the Phantom Camera:
   a. Click the Manger Control Panel tab.
   b. Move the cursor over the desired available Phantom camera you wish to connect to, then
   c. Double-click the left mouse key.
3. Select the Operational Mode.
   a. Click on the Live Control Panel tab, then
   b. Click on the Advanced Setting selector.
      1) Disable, (uncheck), the "Direct recording to CineMag" enable box to operate in Loop Mode.
      2) Enable, (check), the "Direct recording to CineMag" enable box to operate in Run/Stop Mode.

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Via the Phantom (Legacy) Camera Control Software

1. Start the Phantom (Legacy) Camera Control Software application.
2. Open the Acquisition pull-down menu.
3. Select the Setup and Recording... command from the Acquisition menu.
4. Select the Phantom CineMag Operational Mode.
   a. In the Setup and Recording dialogue window click on the Flash mem... button.
   b. In the Flash memory dialogue window:
      1) Disable, (uncheck), the "Record to magazine" enable box to operate in Loop Mode.
      2) Enable, (check), the "Record to magazine" enable box to operate in Run/Stop Mode.
      3) Click the Update button.
      4) Click the OK button.

Via the Phantom 65 or Phantom HD "On-Camera" Control Buttons

1. From the LIVE PRE (Preview, Waiting for Pre-Trigger), or LIVE display screen:
   a. Press the Select Setup button one time, then
   b. Rotate the button to the Operational Mode field parameter. The field will change from yellow to red indicating the field has been selected for changed.
2. Once the Operational Mode field has been selected:
   a. Hold in the Select Setup button, then
   b. Rotate the button to the desired operational mode; Loop or R/S (Run/Stop).

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5.2 Recording to a Phantom CineMag

STEP-BY-STEP PROCESSES

In Loop Mode via the Phantom (PCC) Camera Control Application

Use this option when you wish to edit and save a cine file stored in the cameras DRAM frame buffer to the optional Phantom CineMag non-volatile Flash memory unit manually.

1. Start the Phantom (PCC) Camera Control Application.
2. Select the Phantom camera.
   a. Click on the Manager Control tab, then
   b. Double-click on the Phantom camera desired.
3. Enable Loop Mode.
   a. Click on the Live Control Panel tab.
   b. Click on the Advanced Settings selector, then
   c. Disable, (uncheck), the Direct recording to CineMag option in the CineMag options.
   d. Disable, (uncheck), the Auto save to CineMag/built-in Flash option in the Start/End of Recording actions options.
4. Define all camera capture settings.
5. Click on the Capture button.
6. Trigger the camera.
   a. Apply a "soft" trigger by:
      1) Clicking the Trigger button in the Live Control Panel, or
      2) Depressing the Alt+T keys simultaneously.
   b. To apply a "hard" trigger to the BNC connector marked Trigger on the 19-Pin Capture breakout cable attached to the rear panel of the camera by providing a,
      1) Dry switch closure.
         i. Use of a pickle switch all cameras.
         ii. Depressing the Trigger button on a Phantom 65 or HD camera.
      2) Low TTL pulse signal.
7. Manually Save the camera stored cine file to the Phantom CineMag.
   a. Click on the Play Control tab.
   b. Edit the recorded cine file, then
   c. Click the down arrow on the right of Save Cine button and select the Save RAM cine to Flash command from the pop-up selection window.
   d. Take note of the Phantom CineMag indicators, and the On-Screen Display information.

NOTE

After clicking the Save button a status message will appear with a status bar showing the progress and estimated time remaining to save.

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In Loop Mode via the Phantom (Legacy) Camera Control Software

Use this option when you wish to edit and save a cine file stored in the cameras DRAM frame buffer to the optional Phantom CineMag non-volatile Flash memory unit manually.

1. Start the Phantom (Legacy) Camera Control Software application.
2. Open the Acquisition pull-down menu.
3. Enable Loop Mode.
   a. Select the Camera Options...command from the Acquisition menu.
      1) Ensure the End of Recording Actions>Save Cine to Internal Flash/CineMag option is disabled, (unchecked).
4. Manually Save the camera stored cine file to the Phantom CineMag.
   a. Select the Setup and Recording... command from the Acquisition menu.
      1) Click on the Flash Mem... button to open the Flash Memory dialogue window after a cine has been recorded to the dynamic memory of the camera, then
         i. Specify the image range to be saved to Flash.
            – Enter the image number of the first image to be saved in the First field, then
            – Enter the number of images to be saved in the Count field.
         ii. Click on the Save button.

NOTE

After clicking the Save button a status window will appear with a status bar showing the progress and estimated time remaining to save. When the save process is complete the Flash Memory dialogue window will list the file(s) stored in non-volatile Flash memory identified by the trigger time of each file. There will also be a small box that displays the Flash Cine Count; the number of files stored in Flash memory. The file stored in the cameras memory buffer will remain untouched in the camera's memory buffer until power is removed from the camera, or the instructed by the end-user to delete the cine file.

         iii. Click the Close button to exit the Flash Memory dialogue window.

Loop Mode via the "On-Camera" Control Buttons

1. Place camera into Loop Mode.
   a. Hold-in and rotate the O C Select button to the Mode field.
   b. Select Loop Mode.
   c. Release Select button.
2. Place the camera into Capture (Record) Mode.
   a. Push the on-camera control Trigger button to start recording directly into the camera's DRAM.
3. Place the Camera into the PLAY CST, (Play Cine Stored), Mode.
   a. Depress the Zoom button one time to place the camera into the PLAY CST (ViewCine) mode.
4. Select a Cine for Playback.
   a. Hold the Zoom button in for 1 second to display the cine SELECT screen.

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b. Hold in and rotate the Select Setup button until the desired cine is displayed.

c. Release the Select button.

5. Play/Pause the select cine (Forward).

a. Depress the Zoom button a one time to instruct the camera to forward through the memory buffer or play the images stored in the memory buffer one image at a time until the end of the recording as been reach or the user pauses the playback process.

b. Depress the button a second time to pause the playback process.

6. Play/Pause the select cine (Reverse).

a. Depressing the Trigger button one time instructs the camera to play the image in reverse, continuously one image at a time.

b. Depressing the button a second time will pause the playback process.

7. Step through the select cine.

a. Rotate the Select Setup button clockwise will step forward through the recorded images one image at a time.

b. Rotating the button counter-clockwise will step backwards through the recorded images one image at a time.

8. Edit the recorded cine.

a) Set Mark In.

1) Rotate the Select Setup button to the Memory Buffer Graphical Representation field, then

2) Hold in and rotate the Select Setup button until the desired starting image is displayed on the monitor or in the viewfinder.

3) Release the Select Setup button.

4) Rotate the Setup Select button to the Edit field.

5) Hold in the Select Setup button, then

6) Rotate it until the Mark In option is displayed on the monitor or viewfinder, then

7) Release.

NOTE

The memory buffer graphical representation will now display a vertical line marking the end point of the cine file to be played back.

b) Set Mark Out.

1) Rotate the Select Setup button to the Memory Buffer Graphical Representation field, then

2) Hold in and rotate the Select Setup button until the desired starting image is displayed on the monitor or in the viewfinder.

3) Release the Select Setup button.

4) Rotate the Setup Select button to the Edit field.

5) Hold in the Select Setup button, then

6) Rotate it until the Mark Out option is displayed on the monitor or viewfinder, then

7) Release.

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NOTE

The graphical representation of the memory buffer will now display a vertical line marking the starting point for the cine file to be played back.

9. Save the Cine to the CineMag
   a. Hold in the Select button and rotate counter-clockwise to the Save option
   b. Release

In Run-Stop Mode (via Phantom (PCC) Camera Control Application)

1. Start the Phantom (PCC) Camera Control Application .
2. Select the Phantom camera.
   a. Click on the Manager Control tab, then
   b. Double-click on the Phantom camera desired.
3. Enable Run-Stop Mode.
   a. Click on the Live Control Panel tab.
   b. Click on the Advanced Settings selector.
   c. Enable, (check), Direct recording to CineMag. Capture button will become Record button. Post trigger frames value will be set automatically to 1.
4. Define all camera capture settings, then
5. Click on the Record button. The button will be renamed with Stop recording.
6. Trigger the camera.
   a. Apply a "soft" trigger by:
      1) Clicking the Trigger button in the Live Control Panel, or
      2) Depressing the Alt+R keys simultaneously.
   b. To apply a "hard" trigger to the BNC connector marked Trigger on the 19-Pin Capture breakout cable attached to the rear panel of the camera by providing a,
      1) Dry switch closure, or
         i. Use of a pickle switch all cameras.
         ii. Depressing the Trigger button on a Phantom 65 or HD camera.
      2) Low TTL pulse signal.
   c. Take note of the Phantom CineMag indicators, and the On-Screen Display information.

In Run-Stop Mode (Trigger via Phantom Camera Control Software)

1. Start the Phantom (Legacy) Camera Control Software application.
2. Open the Acquisition pull-down menu.
3. Enable R/S (Run/Stop) Mode.
   a. Select the Camera Options...command from the Acquisition menu.
      1) Enable, (check), the End of Recording Actions>Save Cine to Internal Flash/CineMag option.

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4. Place the camera into Capture, (Record), Mode.
   a. Select the Setup and Recording...command from the Acquisition menu, then
   b. Click on the Capture button.
5. Trigger the camera.
   a. Apply a "soft" trigger by:
      1) Clicking the Trigger button in the Setup and Recording Window, or
      2) Depressing the Alt+T keys simultaneously.
   b. To apply a "hard" trigger to the BNC connector marked Trigger on the 19-Pin Capture breakout cable attached to the rear panel of the camera by providing a,
      1) Dry switch closure, or
         i. Use of a pickle switch all cameras.
         ii. Depressing the Trigger button on a Phantom 65 or HD camera.
      2) Low TTL pulse signal.
   c. Take note of the Phantom CineMag indicators, and the On-Screen Display information.

In Run-Stop Mode (Trigger via "On-Camera" Control Button)

1. Place camera into R/S Mode.
   a. Hold-in and rotate the on camera control Select button to the Mode field.
   b. Select R/S Mode.
   c. Release Select button.
2. Place the camera into Capture (Record) Mode.
   a. Push the on-camera control Trigger button to start recording directly into the Phantom CineMag.
   b. Notice that the Activity and Record indicators are on, and the Total Time Available and Number of Frames Available fields, on the On-Screen Display, are decrementing.
   c. Release the on-camera control Trigger button to stop recording.
   d. Take note of the Phantom CineMag indicators, and the On-Screen Display information.

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5.3 Viewing a Cine File Stored in Phantom CineMag

STEP-BY-STEP PROCESSES

Via the Phantom (PCC) Camera Control Application

1. Start the Phantom (PCC) Camera Control Application .
2. Select the Cine File(s) to be reviewed.
   a. Click on the Manager Control tab, then
   b. Double-click on the cine file(s) to be reviewed. The file stored in non-volatile Phantom CineMag Flash will be indicated by the letter “F” preceding the cine file count, i.e., F1, F2, F3, etc.

NOTE

The color of the Phantom CineMag record cine files will be different that of the cine files recorded in the cameras DRAM frame buffer.

Via the Phantom (Legacy) Camera Control Software

1. Open the ViewCine playback display window.
2. Click the Camera radio button located in the Cine Source fields.
3. Click the down-arrow to the right of the Cine# field, and select the cine #, stored in flash, to be viewed. The file stored in non-volatile Phantom CineMag Flash will be indicated by the letter “F” preceding the cine file count, i.e., F1, F2, F3, etc.
4. Use the Playback buttons to review the selected cine file.
5. Edit the selected cine file.

Via the Phantom 65 or Phantom HD "On-Camera" Control Buttons

1. Once a cine file has been recorded the camera will be placed into the LIVE CST mode.
2. Place the camera into the PLAY CST mode by depressing the Zoom button one time, this will place the camera into the ViewCine state.
3. Select a cine for playback:
   a. Hold the Zoom button in for 1 second to display the cine SELECT screen.
   b. Hold in and rotate the Select Setup button until the desired cine is displayed.
   c. Release the Select button.
4. Play/Pause the select cine (Forward):
   a. Depressing the Zoom button a one time to instruct the camera to forward through the memory buffer or play the images stored in the memory buffer one image at a time until the end of the recording as been reach or the user pauses the playback process.

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b. Depressing the button a second time to pause the playback process.

5. Play/Pause the select cine (Reverse):
   a. Depressing the Trigger button one time instructs the camera to play the image in reverse, continuously one image at a time.
   b. Depressing the button a second time will pause the playback process.
6. Step through the select cine:
   a. Rotate the Select Setup button clockwise will step forward through the recorded images one image at a time.
   b. Rotating the button counter-clockwise will step backwards through the recorded images one image at a time.

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5.4 Editing a Cine File Stored in Phantom CineMag

STEP-BY-STEP PROCESSES

Via the Phantom (PCC) Camera Control Application

1. Start the Phantom (PCC) Camera Control Application.
2. Select the Cine File(s) to be reviewed:
   a. Click on the Manager Control tab, then
   b. Double-click on the cine file(s) to be reviewed. The file stored in non-volatile Phantom CineMag Flash will be indicated by the letter “F” preceding the cine file count, i.e., F1, F2, F3, etc.
3. Set the Mark In Point.
   a. Use the Playback button to locate the desired starting image, then
   b. Click the Mark In button.
4. Set the Mark Out Point.
   a. Use the Playback button to locate the desired ending image, then
   b. Click the Mark Out button.
5. Click on the Play Speed & Options selector.
   a. Enable, (check), Limit to Range, then
   b. Enable, (check), Repeat.
6. Review the edited cine file.
7. Save the selected cine to the Phantom Control Unit.

Via the Phantom (Legacy) Camera Control Software

1. Open the ViewCine playback display window.
2. Click on the Camera radio button located in the Cine Source fields.
3. Click the down-arrow to the right of the Cine# field, and select the cine#, stored in the Phantom CineMag, to be reviewed. The file stored in the Phantom CineMag will be indicated by the letter “F” preceding the cine file count, i.e., F1, F2, F3, etc.
4. Set the Mark In Point.
   a. Use the Playback button to locate the desired starting image, then
   b. Click the Mark In button.
5. Set the Mark Out Point.
   a. Use the Playback button to locate the desired ending image, then
   b. Click the Mark Out button.
6. Enable Endless Loop and Limit to Range.
7. Review the edited cine file.
8. Save the selected cine to the Phantom Control Unit.

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NOTE

The color of the Phantom CineMag record cine files will be different that of the cine files recorded in the cameras DRAM frame buffer.

Via the Phantom 65 or Phantom HD "On-Camera" Control Button

Setting the Mark In Point

1. Rotate the Select Setup button to the Memory Buffer Graphical Representation field, then
2. Hold in and rotate the Select Setup button until the desired starting image is displayed on the monitor or in the viewfinder.
3. Release the Select Setup button.
4. Rotate the Setup Select button to the Edit field.
5. Hold in the Select Setup button, then
6. Rotate it until the Mark In option is displayed on the monitor or viewfinder.
7. Release.

Setting the Mark Out Point

1. Rotate the Select Setup button to the Memory Buffer Graphical Representation field, then
2. Hold in and rotate the Select Setup button until the desired ending image is displayed on the monitor or in the viewfinder.
3. Release the Select Setup button.
4. Rotate the Setup Select button to the Edit field.
5. Hold in the Select Setup button, then
6. Rotate it until the Mark Out option is displayed on the monitor or viewfinder, then
7. Release.

NOTE

The memory buffer graphical representation will now display a vertical line marking the end point of the cine file to be played back.

8. Save the selected cine file to the Phantom Control Unit.

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5.5 Erasing Files from the Phantom CineMag

CAUTION

Be sure to Save all the cine files stored in Phantom CineMag you want to keep before erasing the Phantom CineMag Flash memory. This is an all-or-nothing selection, the memory can only be erased in its entirety, individual files cannot be purged separately.

To use Erase Protect feature place the Erase Protect Switch, located underneath the Phantom CineMag, into the locked position, indicating the CineMag is in Erase Protect Mode. The Erase Protect Indicator will then be active.

STEP-BY-STEP PROCESSES

Via the Phantom (PCC) Camera Control Application

1. Start the Phantom (PCC) Camera Control Application .
2. Select the Phantom camera.
   a. Click on the Manager Control tab, then
   b. Double-click on the Phantom camera desired.
3. Erase all cine files stored in the Phantom CineMag.
   a. Click on the Camera pull-down menu, then
   b. Select the Erase Flash Memory command from the selection list.

RESULT: The system will display the status of the erasing procedure.

Via the Phantom (Legacy) Camera Control Software

1. Start the Phantom Camera Control Software application.
2. Open the Acquisition pull-down menu, then
3. Select the Setup and Recording... command.
4. Erase All the files stored in Flash memory:
   a. Click on the Flash Mem... button to open the Flash Memory dialogue window after a cine has been recorded to the dynamic memory of the camera.
      1) Ensure that the Continuous record to Flash feature is disabled (unchecked).
      2) Click the Erase All button.
      3) When the following Warning message appears, click the Yes button to erase all the file stored in non-volatile Flash memory, the Phantom CineMag.

RESULT: The system will display the status of the erasing procedure.

      4) When the deletion process is complete, click the Close button.

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Part

6 Phantom Miro Control via "Touch-Sensitive" LCD Screens

Updated: 3/18/2010

This module provides the information necessary to perform various tasks using, only on-camera hardware but, the various "touch-sensitive" LCD screens to control your Phantom Miro camera. The topics covered will provide detailed descriptions of each of the various LCD display screens, and Step-by-Step Procedures to control the Phantom Miro using the "touch-sensitive" LCD screens.

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6.1 The LCD Display Screens

Enter topic text here. The "touch-sensitive" LCD display screen is a 3.5-inch diagonal, 640x480 resolution screen, that can be used to frame, focus, and judge exposure when in live mode, or edit and replay a cine file once a cine has been recorded. There are several different display screens that will be covered in the section.

Click on each of the LCD display screens below for an overview of the screen, and a brief description of each of the fields that make up the individual screens.

- LIVE PRE Display Screen
- Power Off Display Screen
- LIVE WTR Display Screen
- LIVE TRG Display Screen
- LIVE CST Display Screen
- PLAY CST Display Screen
- Edit/Save Display Screen
- Save Display Screens and Save Progress Display
- Delete Existing Recording Confirmation Screen

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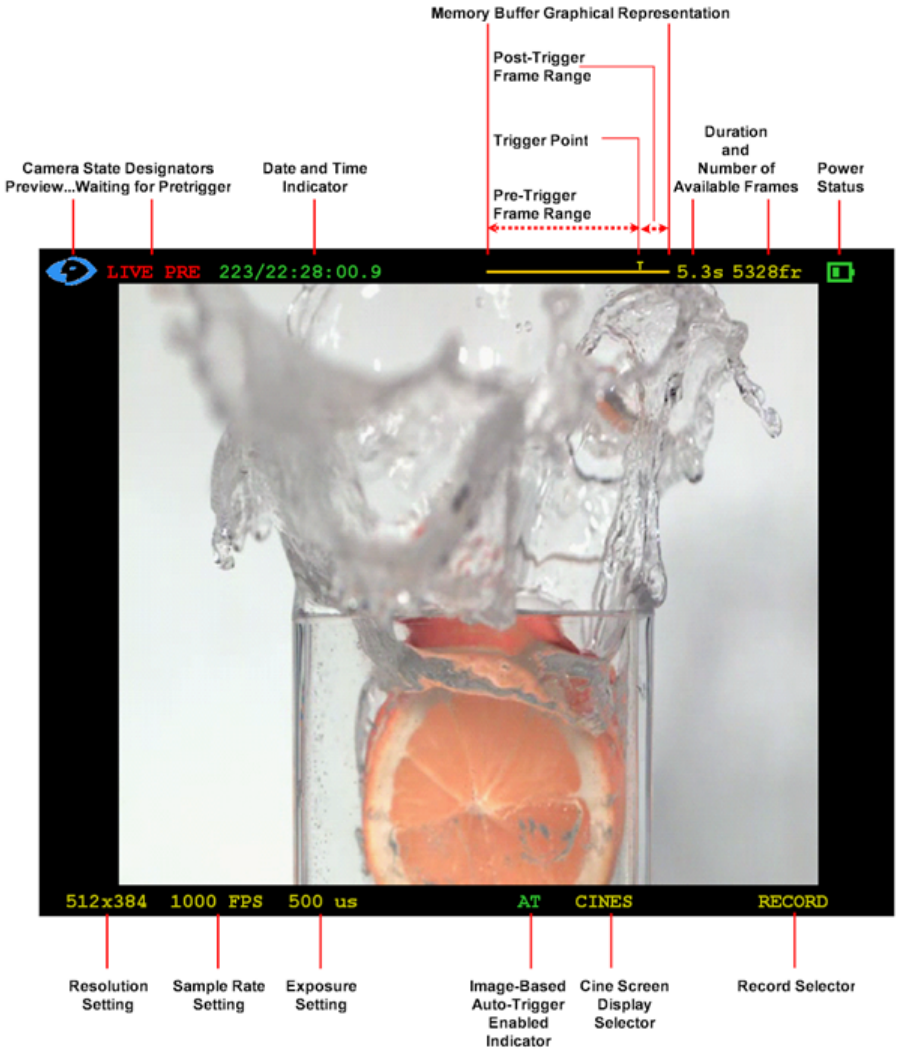
6.1.1 LIVE PRE Display

The LIVE PRE, (live image preview, waiting for pre-trigger) mode, is the operational state the camera will start up in when it is first powered on. What this means is the camera displays a live image on an attached monitor or the camera's LCD display, but is not yet recording any image data or frames to the camera memory buffer.

In this state the user can:

- View a live image to focus.
- Examine the recording duration time and the number of frames that will be recorded within the recording time frame.
- Select various recording parameters.
- Determine if any image area is over exposed.
- Change the operational state of the camera.



LIVE PRE (Preview...Waiting for Pre-Trigger) Mode Display Screen

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STEP-BY-STEP PROCEDURE

Camera State Designators

The camera state designation is comprised of two items; the Phantom logo and text display. The color of the Phantom logo will change based on the state of the camera. The Phantom logo will be cyan (blue) when the camera is in the LIVE PRE mode. The text, to the right of the Phantom logo, indicates the present state or operational mode of the camera.

Date and Time

The date and time stamp field indicates; day number/hour:minute:second:microsecond.

Memory Buffer Graphical Representation

This is a graphical representation of the camera's memory buffer. It acts as a memory gauge that consists of two basic components when the camera is in the LIVE PRE state.

The first component, of the graphical representation is the line which represents the total frames that can be stored in the camera's buffer. The second component is a "T" on top of the line. The "T" represents a trigger point that is defined by the user. Any frame that is captured after a trigger signal is detected by the camera are referred to as Post Trigger frames, and the frames recorded prior to the trigger signal are referred to as Pre-Triggered frames.

Duration

The Duration field indicates the total length of recording time. The recording duration is based on the amount of memory in the camera, along with the resolution and sample rate settings. This field will change based on these variables.

Number of Available Frames

This field indicates how many images or frames will be recorded within the Duration time. This field will also change based on how the amount of memory in the camera, and how the resolution and sample rate are set and will change accordingly.

Power Status

Indicates the power status of the camera as follows:

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	INDICATOR DESCRIPTION		
INDICATOR IMAGE	GREEN	YELLOW	RED
Plug (Externally Power)	Battery is fully charged.	Battery is charging.	N/A
Battery (No External Power)	Battery is well charged.	Battery charge is getting low.	Battery charge is critically low, (approximately 5 minutes left).

CAUTION

If the batter charge indicator turns red, and you have an unsaved cine in memory you should immediately connect the camera to the power supply and save the cine. If you lose camera power you will lose any unsaved cine files.

Resolution Setting Selector

This field indicates the active pixel area, (Width x Height), of the sensor defined by the user. It is also used to set the desired Resolution.

Sample Rate Setting Selector

This field specifies the rate the Phantom camera will capture or record image data, (frames), into the camera's memory. It is also used to set the desired Sample Rate.

Exposure Setting Selector

This field shows the current, user defined exposure setting of the camera. It is also used to set the desired camera Exposure.

Image-Based Auto-Trigger Enabled Indicator

The Image-Based Auto-Trigger Enabled Indicator, (AT), will only be displayed when the Image-Based Auto-Trigger feature has been enabled via the Image-Based Auto-Trigger Display Screen.

Cine Screen Display Selector

This field is used to access the Cine Display window.

Record Selector

This field is used to place the camera into recording mode.

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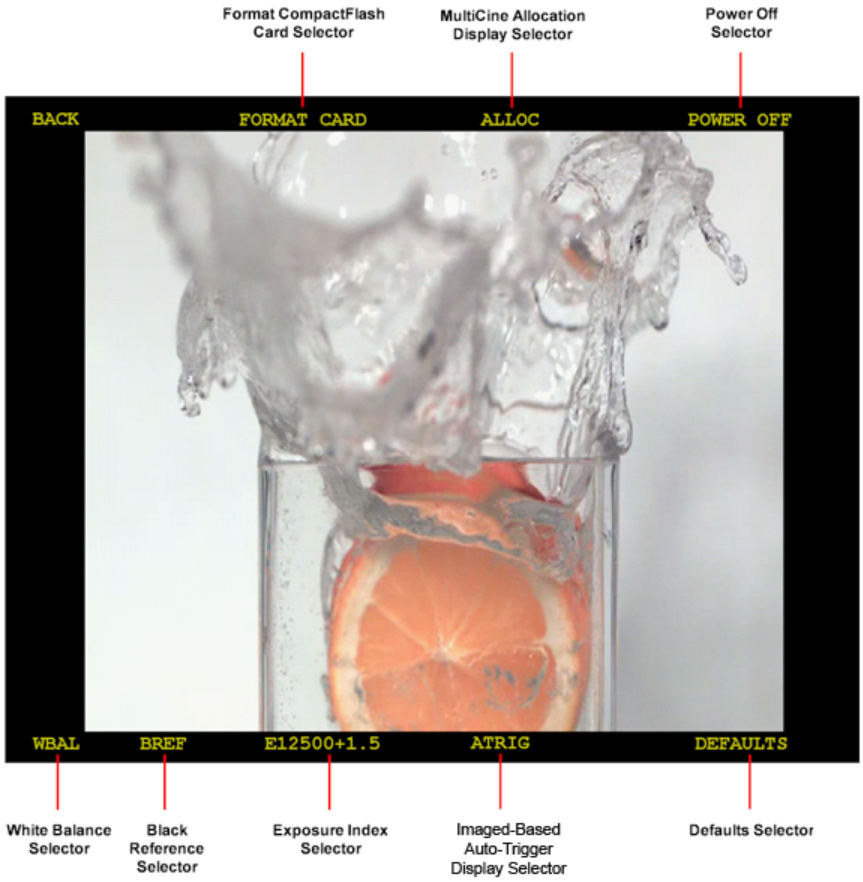
6.1.2 Power Off Display

It is from this display screen that you can instruct the camera to:

- Power Off
- Perform a White Balance Adjustment
- Perform a Black Reference Adjustment
- Adjust the Exposure Index
- Format CompactFlash Card
- Access the MultiCine Allocation and the Image-Based Auto-Trigger Setup Windows
- Restore Camera to Factory Settings



Power Off Display Screen

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THE DISPLAY FIELD DESCRIPTIONS

Back Selector

When selected the camera returns to the previous display.

Format Card Selector

When selected the camera initiates the process to format the installed CompactFlash card.

MultiCine Allocation Display Selector

This selector is used to access the MultiCine Allocation Display window.

Power Off Selector

This selector instructs the camera to power down.

NOTE

Phantom Miro cameras must be placed into the LIVE PRE, (Preview...Waiting for Pre-Trigger), operational state in order to power it down completely. Failure to comply with this instruction will result in the camera running on the battery, eventually draining the camera's battery charge. Only in that mode are you guaranteed to not have a non-saved cine in memory.

White Balance Selector

This selector instructs the camera to perform a White Balance Adjustment. Because of the different "colors" of various types of light sources, a color cameras' preview images may have a color tint that may not appear quite right during setup. The Phantom Miro cameras have several adjustment methods to assist in correcting image color. Using this fast and easy-to-use White Balance control should be the first step in color adjustment.

Black Reference Selector

This selector initiates the Black Reference adjustment process. Performing a Black Reference ensures the best possible images will be captured and recorded by the camera's sensor. A Black Reference adjustment should be performed prior to capturing and recording images whenever possible.

Exposure Index Selector

An amount by which it is possible to over or underexpose a light sensitive material and, with

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standard processing, still produce acceptable results. By referring to the exposure index in the LCD display and working in stops, you can fine tune your exposure.

Image-Based Auto-Trigger Display Selector

This selector is used to access the Image-Based Auto-Trigger Display window.

Defaults Selector

This selector instructs the cameras to restore the camera back to factory default settings.

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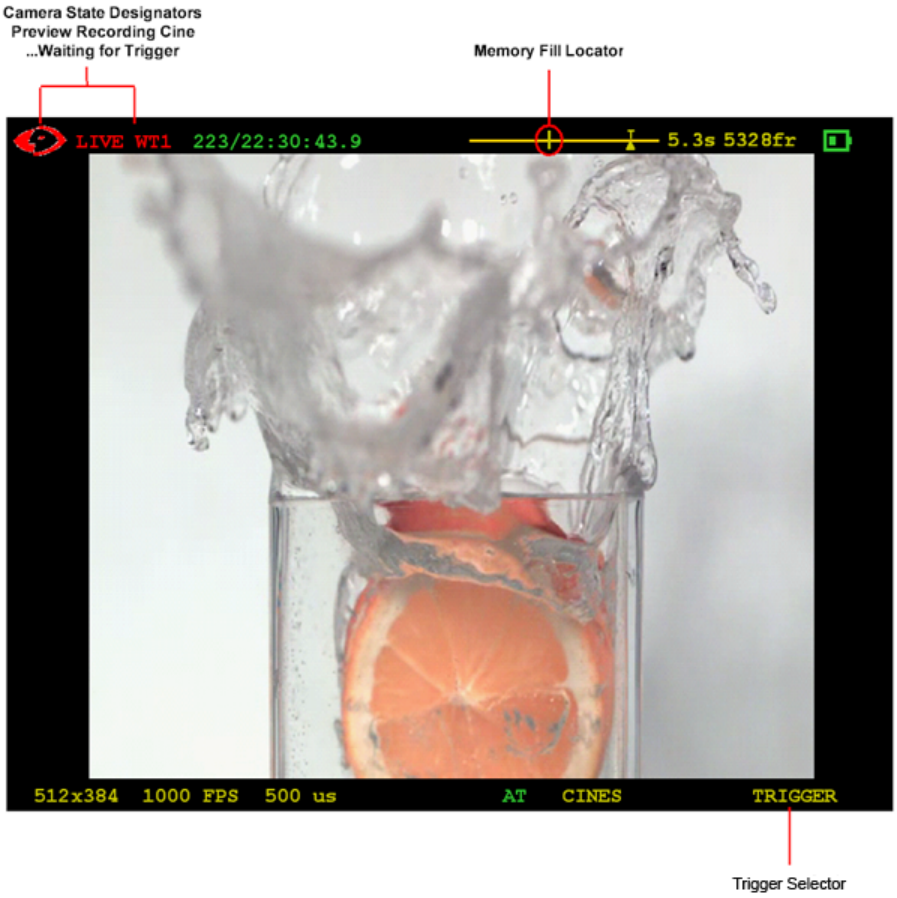
6.1.3 LIVE WTR Display

The LIVE WTR, (live image preview, waiting for trigger) mode, is the operational state the camera will be in when once the camera has been instructed to capture or record image data or frames to the camera's memory buffer. The camera continues to display a live image on a monitor or LCD display screen, just as it did when the camera was in the LIVE PRE mode. The camera will continue to capture or write image data into the camera scrolling memory buffer locations until a trigger signal has been sent and detected by the camera.



LIVE WTR (Preview, Recording Cine...Waiting for Trigger) Mode Display Screen

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THE DISPLAY FIELD DESCRIPTIONS

The majority of the information, displayed on the monitor or viewfinder screens, is the same as the information described under the; "LIVE PRE Display Screen - The On-Screen Display Fields", except for the following differences:

Camera State Designators

The Phantom logo will be red when the camera is in the LIVE WTR, (Preview, Recording Cine... Waiting for Trigger), mode.

Memory Buffer Graphical Representation

The graphical representation of the camera's memory buffer, which acts as a memory gauge will display a Recording to Memory Location Indicator, (a vertical line). It will scroll backwards from the trigger point, (T), indicating that the (pre-trigger) memory buffer is in the process of being filled the moment the camera has been placed into the LIVE WTR mode.

When the indicator reaches the beginning of the line the camera's memory buffer is full. This does not mean that the camera stops recording since the camera utilizes a scrolling buffer technique to fill the buffer. What this means is that the camera writes the captured image data or frame into the first available memory location, the second frame into the second available memory location, and so on until all available memory locations have been written into with image data or frames. Once all the memory locations have been written into the next frame that is captured will overwrite the image data that is presently stored in that first memory location, the next frame overwrites the next location and so on. This process of overwriting memory locations will continue until a trigger signal has been detected by the camera and any user defined post trigger frame requirements have been recorded. It is only at this point the camera will stop overwriting the captured images or frame stored in the memory buffer.

Trigger Camera Selector

This field is used to provide a soft-trigger to the camera.

NOTE

You can also use the On-Camera Trigger button to provide a hard-trigger to the Phantom Miro eX1, Miro 1, Miro eX2, Miro 2, Miro eX4 or Miro 4 camera models by depressing the trigger button.

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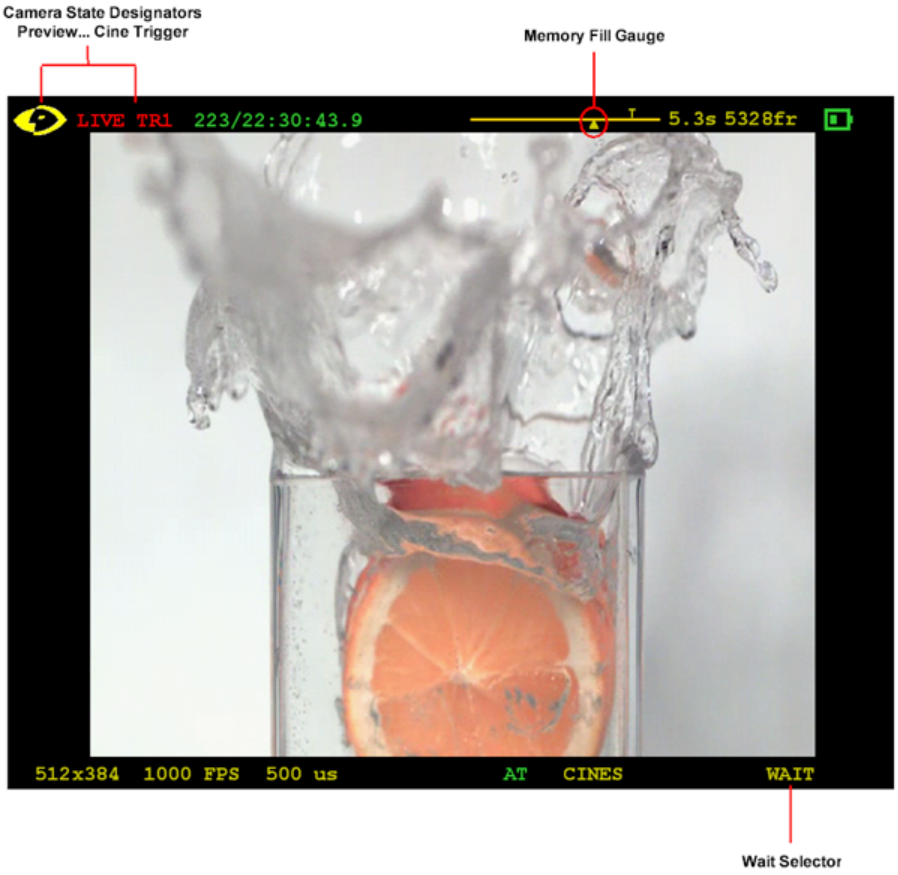
6.1.4 LIVE TRG Display

The LIVE TRG, (live image preview, camera triggered) mode, is the operational state the camera will be in when once the camera has detected a valid trigger signal. The camera continues to display a live image on monitor or built-in LCD screen, just as it did when the camera was in the LIVE PRE or LIVE WTR modes. The camera will stop capturing or writing image data into the camera scrolling memory buffer locations upon receipt of the trigger signal once the user defined post trigger definition, if any, has been satisfied.



LIVE TRG (Preview...Camera Triggered) Mode Display Screen

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THE DISPLAY FIELD DESCRIPTIONS

The majority of the information, displayed on the monitor or viewfinder screens, is the same as the information described under the; "LIVE PRE Display Screen - The On-Screen Display Fields" topic, except for the following differences:

Camera State Designation

The Phantom logo will be yellow when the camera is in the LIVE TRG mode.

Memory Buffer Graphical Representation

The graphical representation of the camera's memory buffer, which acts as a memory gauge will display a Recording to Memory Location Indicator, (a vertical line), that will scroll backwards from the trigger point, (T), indicating that the memory buffer is in the process of being filled the moment the camera has been placed into the LIVE WTR mode.

When the indicator reaches the beginning of the line the camera's memory buffer is full. This does not mean that the camera stops recording since the camera utilizes a scrolling buffer technique to fill the buffer. What this means is that the camera writes the captured image data or frame into the first available memory location, the second frame into the second available memory location, and so on until all available memory locations have been written into with image data or frames. Once all the memory locations have been written into the next frame that is captured will overwrite the image data that is presently stored in that first memory location, the next frame overwrites the next location and so on. This process of overwriting memory locations will continue until a trigger signal has been detected by the camera and any user defined post trigger frame requirements have been recorded. It is only at this point the camera will stop overwriting the captured images or frame stored in the memory buffer.

Memory Fill Gauge

The up-arrow will move toward the right end of the Memory Buffer Graphical Representation line, if you have defined the camera to record post trigger frames, indicating how much longer it will record post trigger frames.

Wait Indicator

This field is an informational field to advise you that the camera is still storing Post Trigger image data into the camera's memory buffer.

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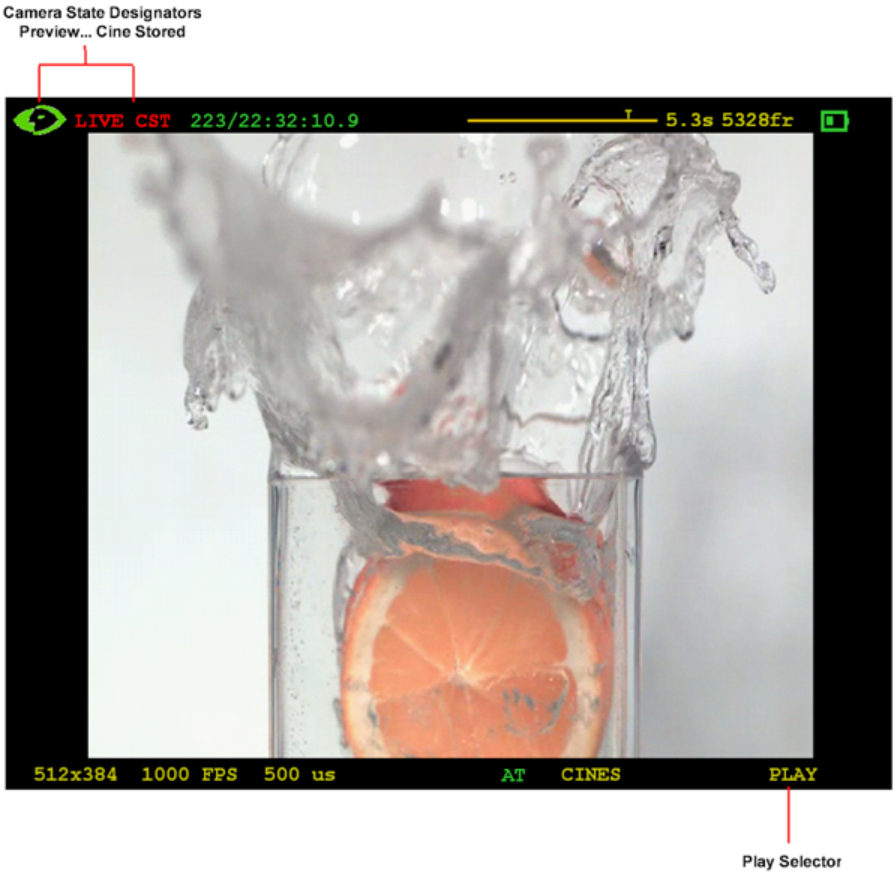
6.1.5 LIVE CST Display

As mentioned in the "LIVE TRG Display Screen - The On-Screen Display Fields" topic, when the camera's memory buffer is full, and the user's defined post trigger frame requirements as been satisfied the camera stops recording image data or frames. Once this process has completed the camera will be placed into the LIVE CST, (live image preview, cine stored), mode, indicating that the camera has recorded a cine in its memory buffer for review, editing, and saving to an external storage device.



LIVE CST (Preview...Cine Stored) Mode Display Screen

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THE DISPLAY FIELD DESCRIPTIONS

The majority of the information, displayed on the monitor or built-in LCD screen, is the same as the information described under the; "LIVE PRE Display Screen - The On-Screen Display Fields" topic, except for the following differences:

Camera State Designation

The Phantom logo will be green when the camera is in the LIVE CST mode.

PLAY Selector

This field is used to access the PLAY CST, (ViewCine Playback), screen.

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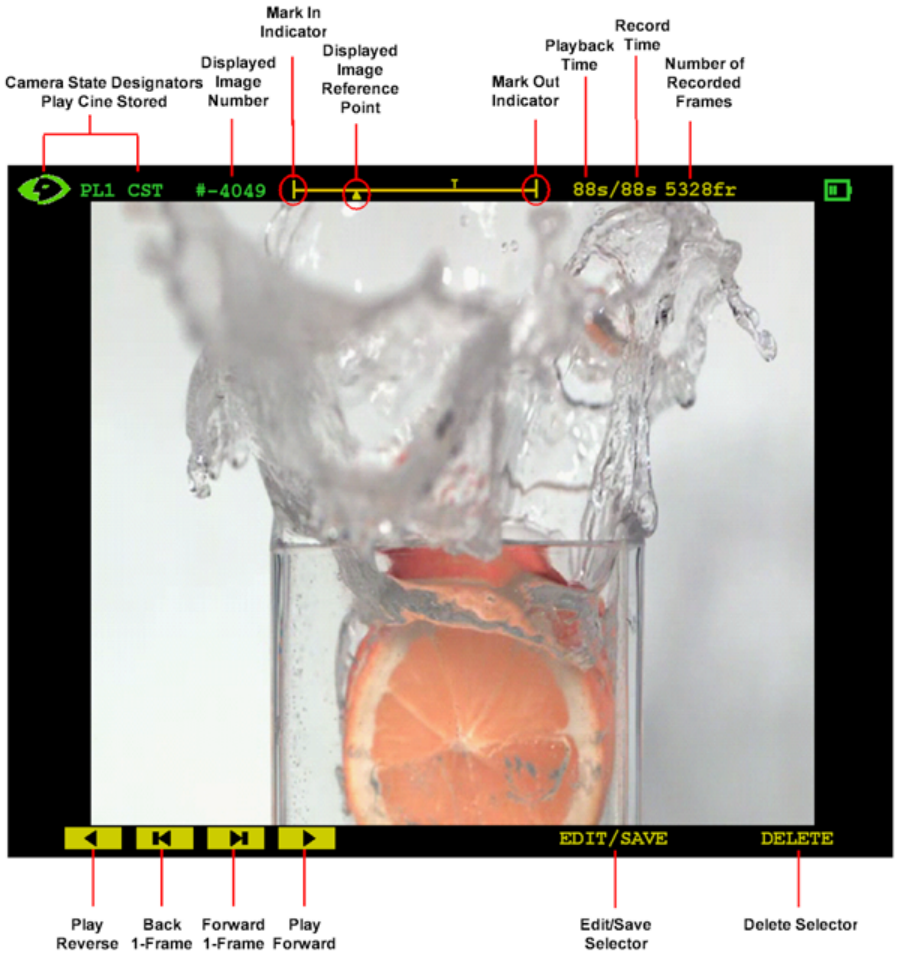
6.1.6 PLAY CST Display

It is from the PLAY CST, (playback, cine stored), mode the user can play back the captured cine file, to review the recorded cine file prior to editing or saving the file. The user can play the cine file forward or in reverse, even pause the playback, using the touch sensitive, built-in LCD display screen.

It is from this display screen you would delete the recorded cine file from the camera's DRAM (Dynamic Read Only Memory) buffer to record a cine file.



PLAY CST (ViewCine Playback) Mode Display Screen

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THE DISPLAY FIELD DESCRIPTIONS

The majority of the information, displayed on the monitor or built in LCD display, is the same as the information described under the; "LIVE PRE Display Screen - The On-Screen Display Fields" topic, except for the following differences:

Camera State Designation

The Phantom logo will be green when the camera is in the PLAY CST mode.

Displayed Image Number

The Displayed Image Number field specifies the number of the image being displayed in the playback window. Zero represents the first image or the trigger point frame. Pre-trigger frames will be represented in negative numbers, while post trigger frames will be positive numbers.

Memory Buffer Graphical Representation

The graphical representation of the camera's memory buffer, which acts as a memory gauge will display the Mark In and a Mark Out Points as vertical lines. The Displayed Image Reference Point Indicator, (the up-arrow), represent the present memory location of the image being displayed. The trigger point, (T), indicates the image or trigger point frame.

Playback Time

The Playback Time represents how much of the total recording duration will be played or saved. This field is depended on the Mark In and Mark End Points which are user definable using the Edit/Save Selector.

Recorded Time

This field indicates the total recording duration time. The duration is determined by the amount of DRAM in the camera, the pixel bit depth, and the sample rate.

Number of Recorded Frames

This filed indicates the total number of frames stored in the camera's DRAM buffer. Just like the Recorded Time, it is determined by the amount of DRAM in the camera, the pixel bit depth, and the sample rate.

Play Reverse Selector

Decrements the recorded cine file 1 image at a time.

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Back 1-Frame Selector

Rewinds the recorded cine file only 1 image.

Forward 1-Frame Selector

Advances the cine file forward only 1 image.

Play Forward Selector

Increments the recorded cine file 1 image at a time.

Image

Pauses/Stops the playback process.

Edit/Save Selector

This field is used to access the Edit Cine or Save Cine display screens.

Delete Selector

This field is used to delete the recorded image data presently stored in the camera's DRAM buffer. When selected the built-in LCD display will advance to the Delete Existing Recording Display screen.

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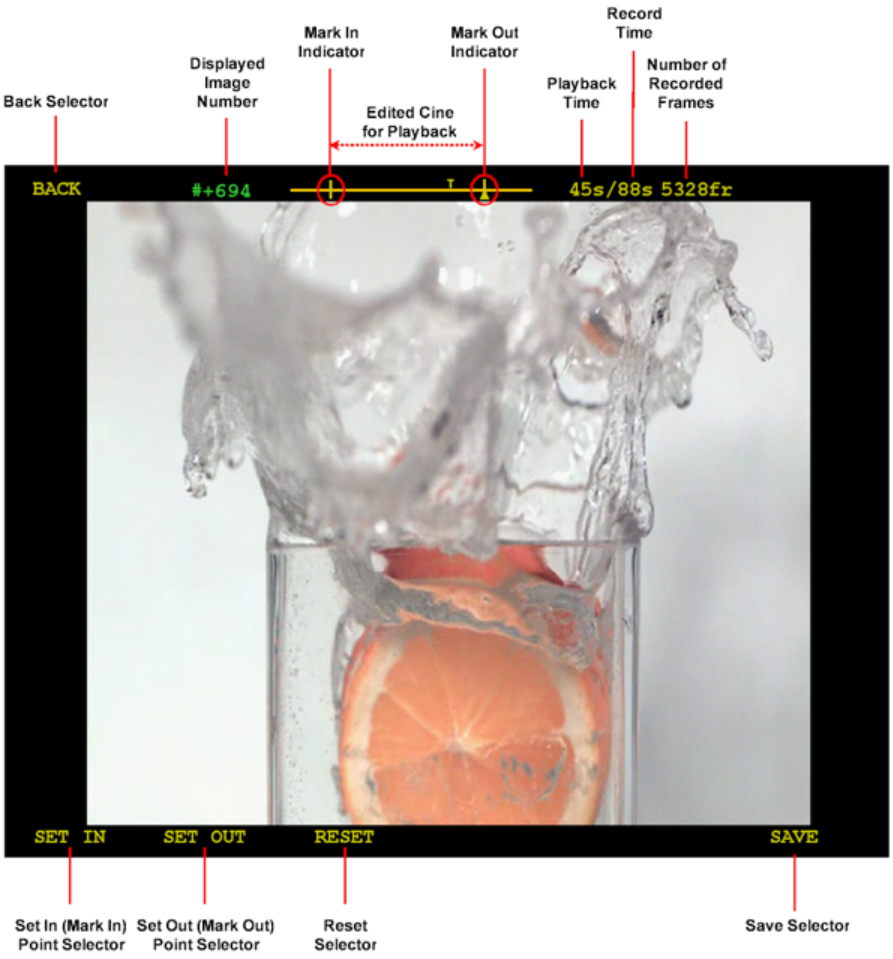
6.1.7 Edit/Save Display

Many recorded cine files contain a lot of unnecessary information both before and after the actual motion of interest. The Edit/Save Display allows you to edit unnecessary images from the beginning and the end of the recorded image data presently stored in the camera's DRAM buffer prior to saving the cine. Editing the cine will create smaller files, reduce file save times and make cine playbacks more interesting.



Edit/Save (Stored Cine) Display Screen

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THE DISPLAY FIELD DESCRIPTIONS

Back Selector

When select the Back Selector returns you to the PLAY CST display.

Displayed Image Number

This field represents the number of the image presently being displayed. If the image was recorded before a trigger signal had been sent and detected by the camera, the image number will be a negative number. Post trigger frames, frames recorded after a trigger signal has been detected by the camera, will be positive numbers.

Memory Buffer Graphical Representation

The graphical representation of the camera's memory buffer, which acts as a memory gauge will display the Mark In and Mark Out Points as vertical lines. The Displayed Image Reference Point Indicator, (the up-arrow), represent the present memory location of the image being displayed. The trigger point, (T), indicates the image or trigger point frame.

Playback Time

The Playback Time represents how much of the total recording duration will be played or saved. This field is depended on the Mark In and Mark End Points, which are user definable using the Edit/ Save Selector.

Recorded Time

This field indicates the total recording duration time. The duration is determined by the amount of DRAM in the camera, the pixel bit depth, and the sample rate.

Number of Recorded Frames

This field indicates the total number of frames stored in the camera's DRAM buffer. Just like the Recorded Time, it is determined by the amount of DRAM in the camera, the pixel bit depth, and the sample rate.

Set In (Mark In) Point Selector

This field allows you to define a new starting point of the cine file presently stored in the camera's DRAM buffer.

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Set Out (Mark Out) Point Selector

This field allows you to define a new end point of the cine file presently stored in the camera's DRAM buffer.

Reset Selector

This field resets the Mark IN and Mark Out points to the first and last frames, respectively, of the image data or frames stored in the camera's DRAM buffer.

Save Selector

This selector field is used to instruct the camera to save the recorded cine file. When selected the built-in LCD display will advances to the Save Display Screen.

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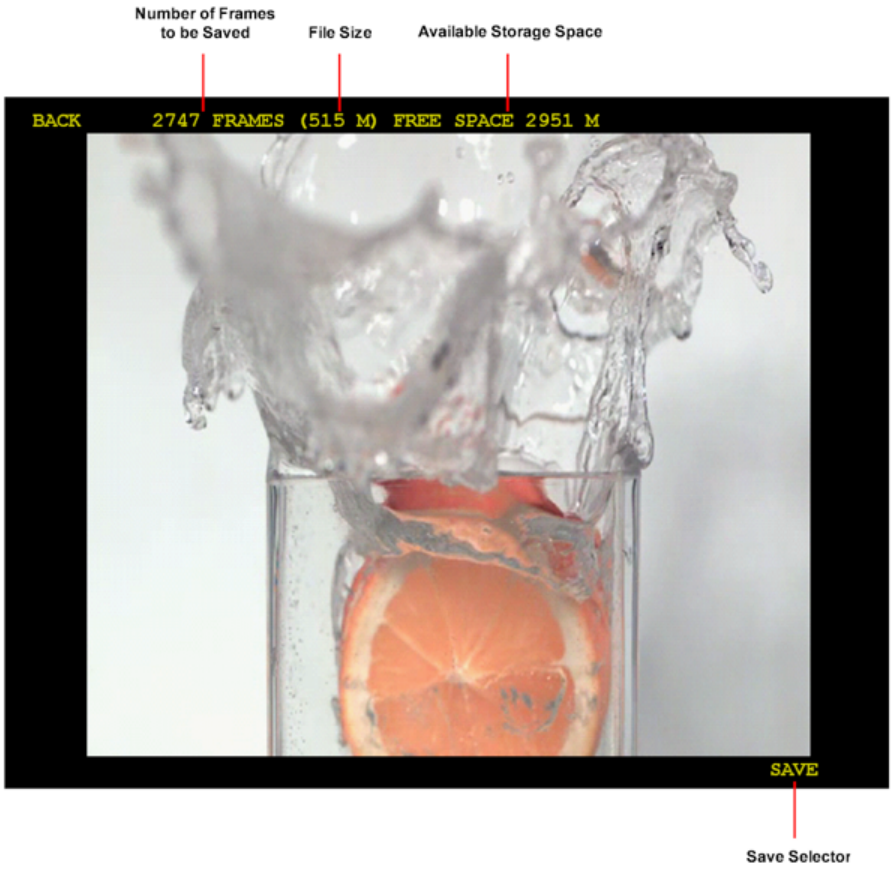
6.1.8 Save Display

This screen is used, primarily, has a Save File confirmation window prior to saving the cine file. It also provides information related to the size of the file you wish to save and the amount of storage space available.



Save (Stored Cine) Display Screen

THE DISPLAY FIELD DESCRIPTIONS

Back Selector

When selected the camera returns to the Edit/Save display.

Number of Frames to Be Saved

Self explanatory.

File Size

Indicates the size of the cine file being saved.

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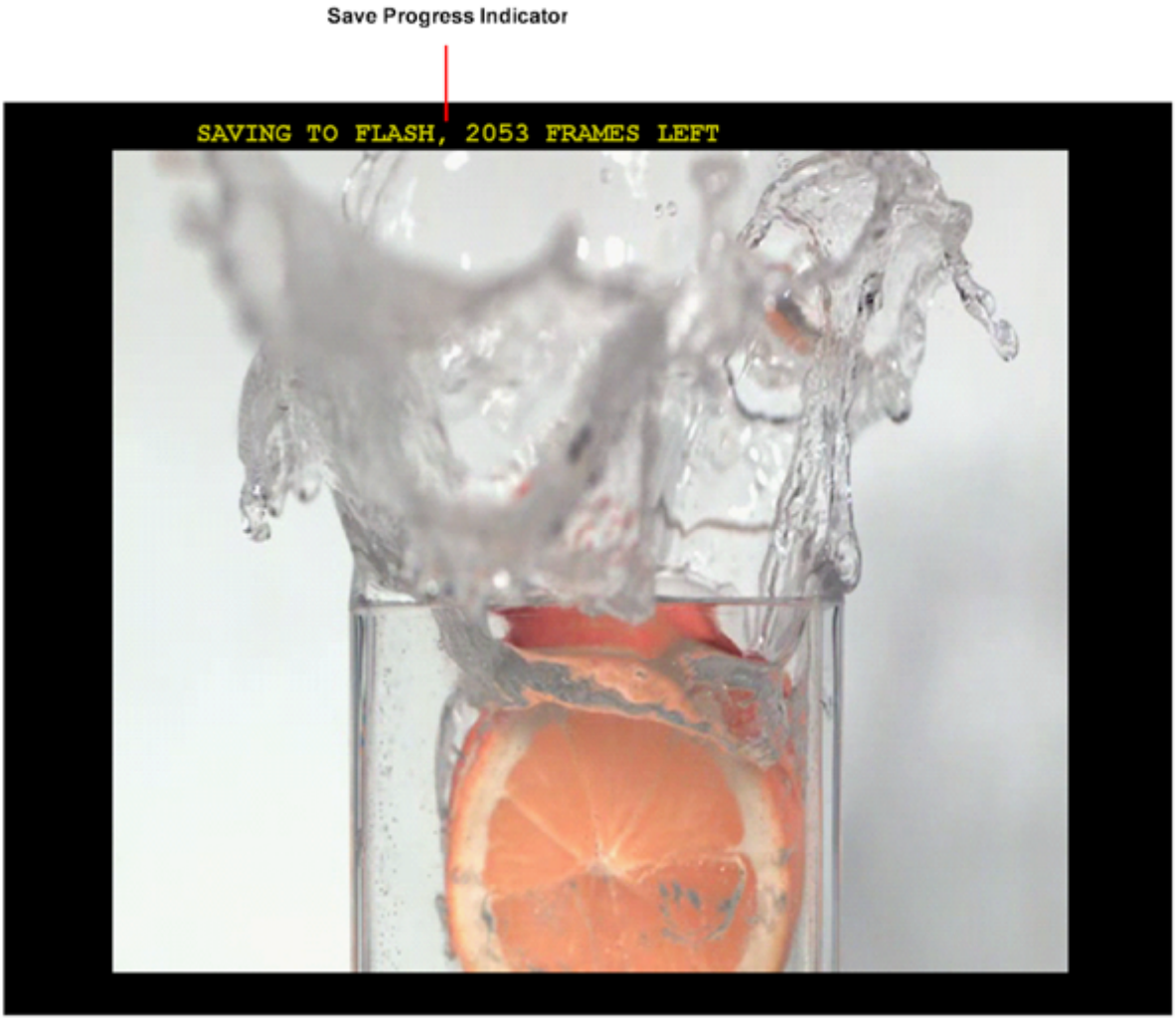
Available Storage Space

Self explanatory.

Save Selector

When selected, the camera will begin to save the frames between the Mark In and Mark Out points. The built-in LCD display advances to the Save Progress Display Screen.



Save Progress Display Screen

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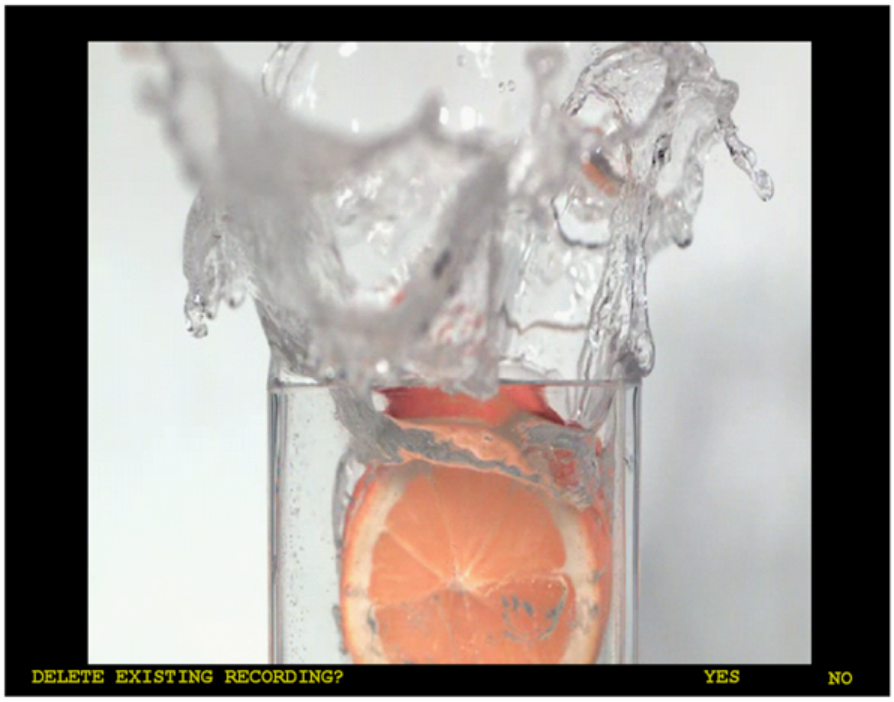
6.1.9 Delete Existing Recording Display

This screen provides a safe guard from accidentally deleting the recorded image data from the camera's internal DRAM buffer. It requires you to provide confirmation to delete the recorded frames prior to deleting the data stored in DRAM.



Delete Existing Recording Display Screen

THE DISPLAY FIELD DESCRIPTIONS

Yes Selector

When selected, the camera deletes all frames or image data stored in the camera's DRAM buffer.

No Selector

This selector aborts the delete process and returns to the PLAY CST Display Screen.

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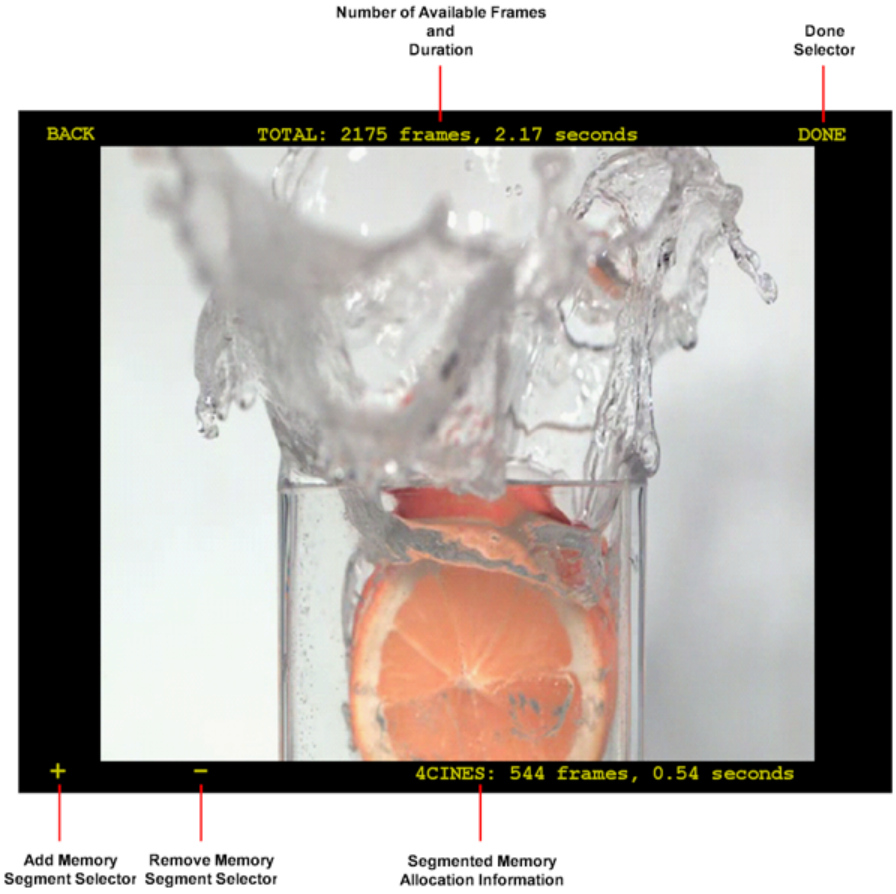
6.1.10 MultiCine Allocation Display

This screen is used to specify how the DRAM, of the camera, is to be partitioned. The DRAM of a Phantom Miro camera can support up to four memory segments' maximum.



MultiCine Allocation Display Screen

THE DISPLAY FIELD DESCRIPTIONS

Number of Available Frames

This informational field displays the maximum number of frames that can be recorded based on the amount of DRAM installed in the camera and the selected Sample Rate.

Duration

This informational field display the total duration it to record the total number of available frames.

Done Selector

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The Done Selector is used to open the Reallocate Memory and Delete All Cines Display screen.

Add Memory Segment Selector

This selector instructs the camera to add one equally partition DRAM memory segment.

Remove Memory Segment Selector

This selector instructs the camera to remove one DRAM memory segment and reallocate the remaining segments to equally partitions of available memory.

Segmented Memory Allocation Information

This informational filed displays the number DRAM memory segments, the number of frames that can be recorded to each segment, and duration to record the frames.

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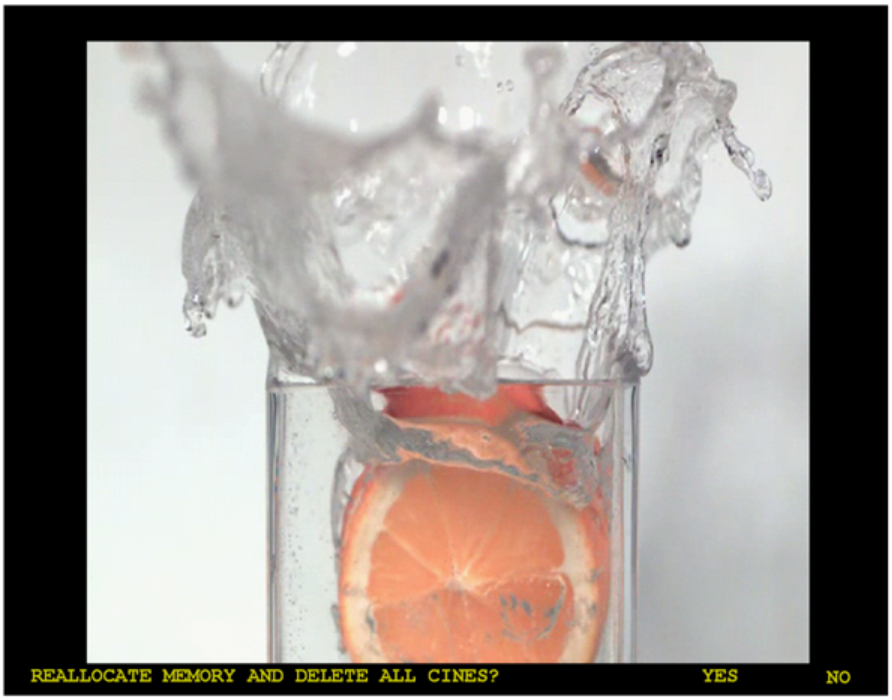
6.1.11 Reallocate Memory and Delete All Cines Display

This screen provides a safe guard from accidentally partitioning the camera's internal DRAM buffer. It requires you to provide confirmation to reallocate the memory and delete any recorded cine prior to performing these actions.



Reallocate Memory and Delete All Cines Display Screen

THE DISPLAY FIELD DESCRIPTIONS

Yes Selector

When selected, the camera reallocates the memory buffer and deletes all frames or image data stored in the camera's DRAM buffer.

No Selector

This selector aborts the reallocation and deletion processes and returns to the MultiCine Allocation Display Screen.

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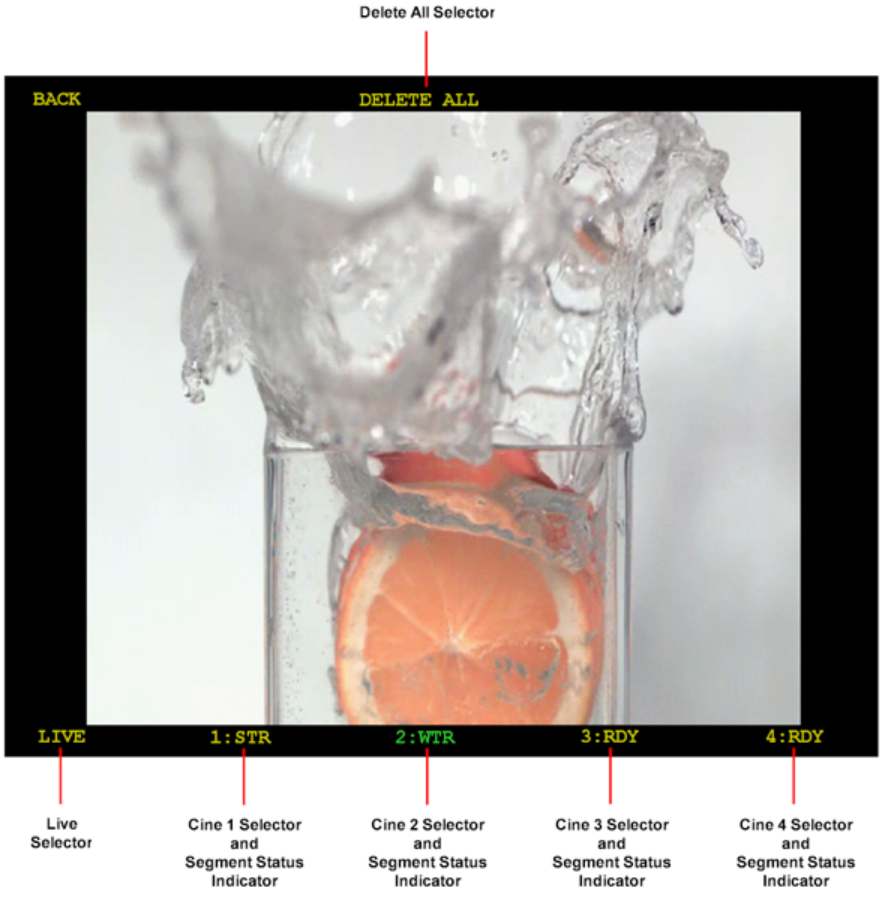
6.1.12 Cine Screen Display

The Cine Screen Display can be used to instruct the camera to:

- Delete all recorded cines, (image data), recorded in all the memory segments of the camera's DRAM.
- Display a live image on the camera's touch-sensitive LCD.
- Select a specific memory segment to play, edit, save or delete image data from, or record image data to.

The number of cines displayed is dependent upon the number of memory partitions allocated via the MultiCine Allocation Display screen. The maximum number of partitions supported by a Phantom Miro eX2, Miro 2, Miro eX4 or Miro 4 camera is four.



Cine Screen Display Screen

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THE DISPLAY FIELD DESCRIPTIONS

Delete All Selector

When selected, the camera deletes all frames or image data stored in all the DRAM partitions.

Live Selector

When selected this selector instructs the camera to display a live image on the touch-sensitive LCD screen.

Cine Selector and Segment Status Indicator

The status indicator displays the status of memory segment, (see table below for status descriptions). When selected in the RDY, (Ready), State the camera starts recording image data to the selected partition and the segment is placed into the WTR, Waiting for Trigger), state. When select while in the STR, (Stored), state the Play CST Display will open allowing the user to view, edit, save or delete the recorded image data stored in the memory partition.

NOTE

The number of cine memory segments displayed is determined by the number of partitions specified in the MultiCine Allocation Display screen.

Status Indicator Table

STATUS	DESCRIPTION
RDY	RDY, (Ready), indicates that the camera is in the Preview, Waiting for pre-trigger... mode. The camera memory segment is placed into the Preview, Waiting for pre-trigger... mode by default. The Preview, Waiting for pre-trigger.. status means that the memory segment is capturing only Preview images and is not yet recording image data into it.
WTR	WTR, (Waiting for Trigger), indicates the camera is in the Preview + Recording cine... Waiting for trigger mode. It indicates the memory segment is in Capture mode, recording images, using these images for the Preview, while storing these images in the DRAM partition. The recording process will stop when a trigger signal is detected and all the post trigger frames have been stored in the memory buffer segment.

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STATUS	DESCRIPTION
TRG	TRG, (Triggered), indicates the camera is Preview + Recording cine... Cine triggered mode. This mode indicates the camera has detected a trigger signal but had not yet finished recording all specified Post Trigger frames to the memory segment.
STR	STR, (Stored), indicates the camera is in the Preview mode. Preview status means that there is a cine recorded in the memory segment, and the camera is capturing only Preview images, not overwriting the cine images stored in the partitioned segment. The recorded cine can now be viewed via the Play CST Display screen.

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6.1.13 Image-Based Auto-Trigger Display

WARNING

The Image-Based Auto-Trigger feature should never be used in applications where missed or false triggers cannot be tolerated or where a false trigger could cause harm to people or property.

The hardware signaling available in some Image-Based Auto-Trigger modes should be used only to synchronize multiple Phantom cameras together and should never be used to trigger or control any other external device or event.

CONSEQUENCES RESULTING FROM SYSTEM FAILURE, FALSE TRIGGERING OR MISUSE OF THIS FEATURE ARE THE SOLE RESPONSIBILITY OF THE USER.

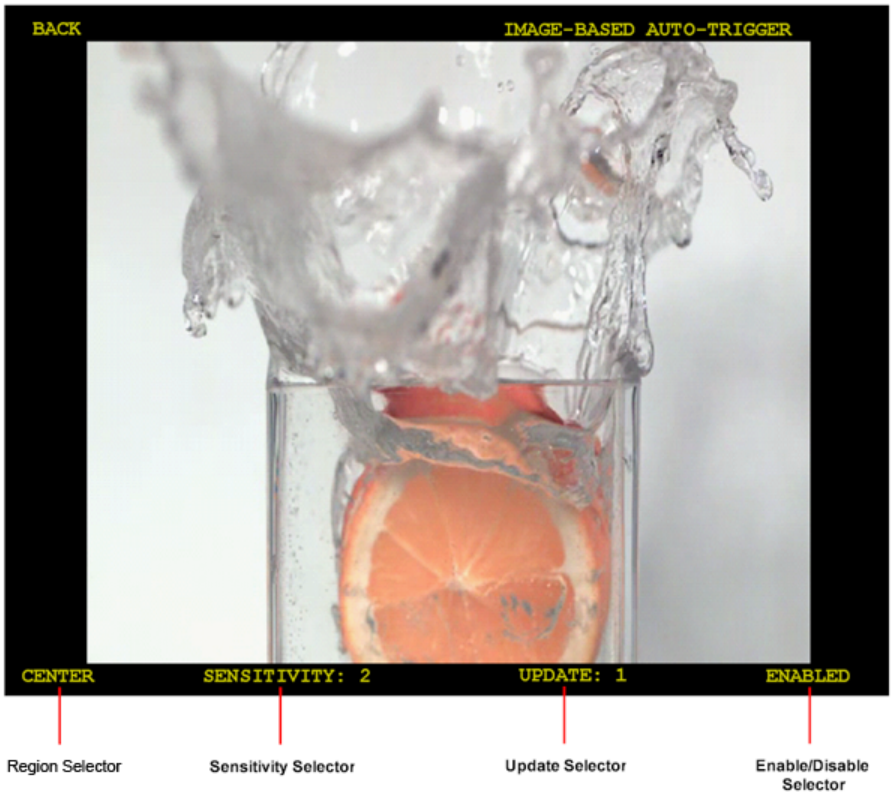

Image-Based Auto-Trigger Display Screen

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THE DISPLAY FIELD DESCRIPTIONS

Region Selector

The Auto-Trigger Region allows the uses the center point of a user selectable region of the image, based on the image resolution setting. Selectable regions include:

- Center - specifies that the:
  - Height will be either 1/4 of the image height, or 16 pixels, whichever is larger, and the
  - Width will be either 1/4 of the image width, or 128 pixels, whichever is larger.
- Top Left quadrant.
- Top Right quadrant.
- Bottom Left quadrant.
- Bottom Right quadrant.
- Custom Region presently uses the same region as the Center option. However, it will be user definable region in the future. This region will be definable via the Phantom Camera Control Software interface.
- Full Screen. (Full image resolution.)

For details on the Region settings see: Phantom Miro Control via "Touch-Sensitive" LCD Screen>Step-by-Step Procedures>Using Image-Based Auto-Trigger with a Phantom Miro>Image-Based Auto-Trigger Region Tables.

Sensitivity Selector

The Sensitivity parameter defines both the:

- Area

  The percentage of the auto-trigger region that must be active in order for an auto-trigger event to be generated. A typical percentage value is 10.

- Threshold

  The amount a pixel value must change in order to be counted as an active pixel for auto-trigger purposes. A value of 100 would require a change of approximately half of the full swing of the camera. A typical threshold setting would be 10.

A larger sensitivity setting means a lower area and threshold.

For details on the Sensitivity settings see: Phantom Miro Control via "Touch-Sensitive" LCD Screen>Step-by-Step Procedures>Using Image-Based Auto-Trigger with a Phantom Miro>Image-Based Auto-Trigger Sensitivity Table.

Update Selector

The Update, (Speed), Selector defines the number of frames between updates of the auto-trigger reference memory. A value larger than 1 allows the trigger to activate on slower events.

Image changes are evaluated over a time interval of auto-trigger speed/frame rate.

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A larger update number will make the trigger slower as it will compare an image over more frames.

See the Phantom Miro Control via "Touch-Sensitive" LCD Screen>Step-by-Step Procedures>Using Image-Based Auto-Trigger with a Phantom Miro>Image-Based Auto-Trigger Update Table for more details.

Enable/Disable Selector

This selector is used to enable or disable the Image-Base Auto-Trigger feature.

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6.2 Step-by-Step Procedures

This section describes the most common tasks you will use when working with your Phantom Miro imaging system. It is designed as a "How-To" guide. It is organized roughly in the order that you would perform the tasks. Most of the topics contain links to background information and other relevant subjects so you can just pick out the task you need to perform and begin.

The topics in this section are intentionally kept as brief as possible. The focus is on how to do start, set/change parameters, access various LCD display screens, capture, playback, edit, save and delete images with your Phantom Miro camera.

NOTE

Not all setting or range settings can be set via the "touch-sensitive" LCD display. The LCD screen allows the user to select one of several preset values. The Phantom Camera Control application may be required to achieve the most optimum recording settings and desired feature set.

Topics will included:

1. Starting the Phantom Miro camera
2. Changing the camera settings using your finger or a stylus
3. Formatting the CompactFlash Card
4. Placing the camera into the recording mode
5. Triggering the camera
6. Viewing the recorded cine
7. Deleting the recorded cine
8. Editing the recorded cine
9. Saving the edited cine
10. Powering off the camera
11. Viewing a cine saved on the CompactFlash card
12. Using the Multicine feature with a Miro camera

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6.2.1 Turning On the Phantom Miro Camera

STEP-BY-STEP PROCEDURE

1. Apply power to the camera.
2. Press the Power-On/Trigger button.

RESULT: The Ethernet Indicator activates green and immediately afterwards the Power Indicator will activate as red. During the Power-up Diagnostics routine the Ethernet LED turns magenta and flashes. Once the power-up process has completed the Capture Indicator will flash one time, and the Power Indicator will turn white.

NOTE

The start-up process takes approximately 15-seconds to complete. Once completed the camera will be placed into the LIVE PRE, (Live Preview), Mode.

6.2.2 Changing Settings via the LCD Display

There are two methods of manipulating the "touch-sensitive" LCD display screen fields. The first method is to use your finger, while the second method is to use a stylus to change the camera's settings via the screen.

STEP-BY-STEP PROCEDURE

Selecting a Value to Change

1. Press directly on the value itself.

Increasing a Value

After select the value to change:

1. Pressing directly on the value a second time increases the value.
2. Repeat until the desired value is displayed.

NOTE

The display will stop increasing when set to the maximum setting.

Decreasing a Value

After select the value to change:

1. Press approximately 1/3 the screen height above a value, which is located at the bottom of the screen, to decrease the value, or
2. Press approximately 1/4 the screen height below a value, located at the top of a screen, to decrease the value.
3. Repeat until the desired value is displayed.

NOTE

The display will stop decreasing when set to the maximum setting.

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6.2.2.1 Specifying the Trigger (Post Trigger Value) Point

The Trigger Point, or Post Trigger Value), sets the number of images to be saved after a trigger has been detected. Setting the number of post trigger images also determines the reciprocal number of pre-trigger images saved.

STEP-BY-STEP PROCEDURE

1. From the LIVE PRE Display Screen:
   a. Press approximately 1/4 the screen height below the right edge of the Memory Buffer Graphical Representation Bar to move the Trigger Point to the right.
   b. Continue until the desired trigger position is achieved.
   c. Press approximately 1/4 the screen height below the left edge of the Memory Buffer Graphical Representation Bar to move the Trigger Point to the left.
   d. Continue until the desired trigger position is achieved.

NOTE

Placing the Trigger Point to the right edge of the Memory Buffer Graphical Representation Bar the camera will stop recording process the moment the camera is triggered, thereby only pre-triggered frames will be recorded.

Placing the Trigger Point to the left edge of the Memory Buffer Graphical Representation Bar the camera fills the memory buffer with Post Trigger frames, images the camera capture after the camera is triggered, only. In other words, the trigger starts the recording. The camera will stop recording images once the memory buffer is completely filled.

Placing the Trigger Point anywhere on the Memory Buffer Graphical Representation Bar, except for the right or left edges, records both pre-trigger and post trigger fames.

6.2.2.2 Specifying the Sample Rate

The Sample Rate specifies the rate at which images are to be recorded. The Sample rate is depended upon the defined Resolution (width x height) of the images being captured.

The LCD screen allows the user to select one of the several preset sample rates. If the desired frame rate is not listed, you will need to use the Phantom Camera Control application to enter the desired sample rate. For step-by-step details using the Phantom Camera Control application, click the following link: Step-by-Step Processes>Live Control Panel Procedures>Define the Sample Rate.

To set high sample rates reduce the selected Resolution (width x height).

STEP-BY-STEP PROCEDURE

1. From the LIVE PRE Display Screen:
   a. Press directly on the Sample Rate field to select the field.
   b. Pressing directly on the value a second time increases the value.
   c. Pressing approximately 1/3 the screen height above the value to decrease the value.
   d. Repeat until the desired value is displayed.

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6.2.2.3 Specifying the Resolution

The Resolution setting allows the user to change the dimensions of the images. The Resolution is the width to the height ratio of the image to be recorded. Each type of camera has a specific maximum resolution. Changing the Resolution settings to match the dimensions of the subject of interest allows the user the option of recording at higher sample rates, or longer recording times at the same sample rate.

The LCD screen allows the user to select one of the several preset resolutions. If the desired resolution is not listed, you will need to use the Phantom Camera Control application to enter the desired resolution. For step-by-step details using the Phantom Camera Control application, click the following link: Step-by-Step Processes>Live Control Panel Procedures>Define the Resolution.

STEP-BY-STEP PROCEDURE

1. From the LIVE PRE Display Screen:
   a. Press directly on the Resolution field to select the field.
   b. Pressing directly on the value a second time increases the value.
   c. Pressing approximately 1/3 the screen height above the value to decrease the value.
   d. Repeat until the desired value is displayed.

NOTE

This Resolution of a Phantom Miro 1 is fixed at 640x480, and con not be changed.

6.2.2.4 Specifying the Exposure

The LCD screen allows the user to select one of the several preset exposure times. If the desired exposure time is not listed, you will need to use the Phantom Camera Control application to enter the desired exposure time. For step-by-step details using the Phantom Camera Control application, click the following link: Step-by-Step Processes>Live Control Panel Procedures>Define the Exposure Time .

STEP-BY-STEP PROCEDURE

1. From the LIVE PRE Display Screen:
   a. Press directly on the Exposure field to select the field.
   b. Pressing directly on the value a second time increases the value.
   c. Pressing approximately 1/3 the screen height above the value to decrease the value.
   d. Repeat until the desired value is displayed.

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6.2.3 Accessing the Power Off Display

As mentioned earlier in this file, is from this display screen that you can instruct the camera to:

- Power Off
- Perform a White Balance Adjustment
- Perform a Black Reference Adjustment
- Adjust the Exposure Index
- Format CompactFlash Card
- Restore Camera to Factory Default Settings

STEP-BY-STEP PROCEDURE

1. Press on the Phantom logo located in the upper left-hand corner of the LIVE PRE Display Screen.

6.2.4 Performing a White Balance Adjustment

Because of the different "colors" of various types of light sources, a color cameras' preview images may have a color tint that may not appear quite right during setup. The Phantom camera has several adjustment methods to assist in correcting image color. Using the fast and easy to use White Balance control should be the first step in color adjustment.

STEP-BY-STEP PROCEDURE

1. Point the camera at a known white object.
2. Align the object to center of the frame.

NOTE

The camera requires centers on a 32 x 32 pixel area in the center of the frame to calculate and adjust for white.

3. Press the WBAL (White Balance) selector in the Power Off Display.

RESULT: The White Balance Adjustment is performed instantaneously, and the camera will return to the LIVE PRE screen once the adjustment is completed.

4. Examine the display, if you need to perform a White Balance again, simply repeat the process until you are satisfied.

NOTE

The White Balance adjustment process should be performed whenever lighting conditions change.

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6.2.5 Performing a Black Reference Adjustment

Performing a Black Reference Adjustment, called Current Session Reference in some of the other Phantom camera models, will calibrate the camera at its current settings to eliminate noise and produce the best images possible.

STEP-BY-STEP PROCEDURE

1. Cover the lens with the lens cap.
2. Press the BREF (Black Reference) selector in the Power Off Display.

RESULT: The BREF selector will change to a counter that will count down to zero. When the Black Reference adjustment has completed its process the camera will return to the LIVE PRE screen.

NOTE

The Black Reference adjustment process should be performed whenever your camera settings are changed.

6.2.6 Selecting an Exposure Index

The Exposure Index is an advanced feature, one which you may never need to use. It is an amount by which it is possible to over or underexpose a light sensitive material and, with standard processing, still produce acceptable results. By referring to the exposure index in the LCD display and working in stops, you can fine tune your exposure.

Essentially it indicates the effective ISO, or sensitivity of the camera under current conditions.

STEP-BY-STEP PROCEDURE

1. From the Power Off Display Screen:
   a. Press directly on the Exposure Index field to select the field.
   b. Pressing directly on the value a second time increases the value.
   c. Pressing approximately 1/3 the screen height above the value to decrease the value.
   d. View the live image. If the Exposure Index is too high or low the image will appear distorted.
   e. Repeat until the desired value is displayed.

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6.2.7 Formatting the CompactFlash Card

The Format feature when initiated, formats the CompactFlash Card, inserted into the Miro camera so it can be read from a CompactFlash card reader connected to the Windows OS, (Operating System), computer.

STEP-BY-STEP PROCEDURE

Via the "Touch-Sensitive" LCD Display

1. From the Power Off Display Screen:
   a. Press directly on the Format Card field to access the Format Card Confirmation display screen.
   b. In the Format Card Confirmation display screen click the Yes selector to format the CompactFlash Card.

Via a CompactFlash Card Reader Connected to a Windows OS Computer

1. Attach the CompactFlash Card Reader to the computer.
2. Insert the CompactFlash card into the reader.
3. From the computer desktop:
   a. Click the Start button.
   b. Select My Computer.
   c. In the My Computer display screen:
      1) Locate and highlight the CompactFlash drive, then
      2) Right-mouse click.
      3) In the pop-up selection window select the format command.
      4) In the Format Local Disk dialogue window:
         a) Click the down-arrow to the right of the File System field and select the appropriate file system.
         b) Click the Start button.

Via a CompactFlash Card Reader Connected to an Apple OS Computer

1. Attach the CompactFlash Card Reader to the computer.
2. Insert the CompactFlash card into the reader.
3. From the computer desktop:
   a. Click the Application icon, then
   b. Select Utilities.
   c. In the Utilities window:
      1) Select the CompactFlash drive.

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2) Select the Erase Tab.

3) Select the Volume Format by click the down-arrow next to the Volume Format entry field.

4) Click Erase.

6.2.8 Placing a Phantom Miro Camera Into the LIVE WTR (Recording) Mode

The Exposure Index is an advanced feature, one which you may never need to use. It is an amount by which it is possible to over or underexpose a light sensitive material and, with standard processing, still produce acceptable results. By referring to the exposure index in the LCD display and working in stops, you can fine tune your exposure.

Essentially it indicates the effective ISO, or sensitivity of the camera under current conditions.

STEP-BY-STEP PROCEDURE

1. From the Power Off Display Screen:
   a. Press directly on the Exposure Index field to select the field.
   b. Pressing directly on the value a second time increases the value.
   c. Pressing approximately 1/3 the screen height above the value to decrease the value.
   d. View the live image. If the Exposure Index is too high or low the image will appear distorted.
   e. Repeat until the desired value is displayed.

6.2.9 Triggering the Miro Camera

Triggering a Phantom Miro camera can be accomplished either by applying a "soft" trigger or "hard" trigger to the camera. Upon detection of the Trigger signal the camera will stop recording images into the cameras DRAM immediately, unless otherwise configured to capture a user specified number of Post Trigger frames.

STEP-BY-STEP PROCEDURE

Via the LIVE WTR Screen

1. Press the Trigger selector to supply a soft-trigger signal to the camera.

Via the Camera's Power On/Trigger Button

1. Depress the Power On/Trigger button to apply a hard-trigger to the camera.

Via the Capture Cable

1. Provide a hard trigger to the camera by supplying:
   a. Dry switch closure, or
   b. Low TTL pulse signal

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Via the Phantom Camera Control Software

For details to provide a soft-trigger to the camera using the Phantom Camera Control application, click the following link: Step-by-Step Processes>Live Control Panel Procedures>Triggering the Phantom Camera.

Result of Supplying a Trigger

Upon detection of the trigger signal the Phantom logo, located in the upper left-hand corner of the screen, will be changed to yellow. The Camera State Designator will also change to the LIVE TRG, (Live, Triggered), state. If the camera has been configured to record post trigger frames, the Memory Fill Indicator will advance forward, (to the right), of the Trigger Point on the Memory Buffer Graphical Representation Bar, indicating the camera is continuing to record the user-defined amount of post trigger images.

During the post trigger frame recording process a Wait Indicator will be displayed in the lower right-hand corner of the screen.

The LIVE TRG state will only be displayed when the sample rate is set to low recording speed.

When the recording is completed the Phantom logo will turn green, and the Camera State Designator changes to the LIVE CST, (Live, Cine Stored) state.

6.2.10 Viewing a Stored Cine File

As mentioned earlier in this file, it is from the PLAY CST, (playback, cine stored), mode the user can play the captured cine file, to review the recorded cine file prior to editing or saving the file. The user can play the cine file forward or in reverse, or pause the playback, using the touch sensitive, built-in LCD display screen.

It is from this display screen you would delete the recorded cine file from the camera's DRAM (Dynamic Read Only Memory) buffer to record a cine file.

NOTE

To view a cine stored on the Type 1 CompactFlash, saved from a Miro eX1, Miro 1, Miro eX2, Miro 2, Miro eX4, or Miro 4, model camera, you will need to remove the Compact Flash card from the camera and insert it into the attached CompactFlash card reader connected to the Phantom Control Unit.

STEP-BY-STEP PROCEDURE

Accessing the PLAY CST Screen

1. Press on the Play selector in the LIVE CST Display Screen.

RESULT: The Phantom logo remains green, and the Camera State Designator changes to the PLAY CST, (Play, Cine Stored) state. The recorded cine will automatically start to play. While the cine is playing the Displayed Image Number increments, if the cine is playing forward, or decrement if the cine is being played back in reverse. The Displayed Image Reference Point will be moving to the right when the cine is being played forward, or to the left if the cine is being

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played back in reverse. As we mentioned earlier in this file the frame number is relevant to the trigger. Pre-trigger frames will have negative numbers, while post trigger frames will have positive numbers, and the trigger is at frame zero.

Using the Playback Control Selectors

You can manipulate how the cine file is to play by using the Playback Control Selectors in the PLAY CST screen. The Playback Control selectors are located at the bottom of the screen. From right to left they are:

Single Frame Reverse - Steps the cine file backward one frame only.

Reverse - Plays the cine file backwards at the normal speed.

Forward - Plays the cine file forward at the normal speed.

Singe Frame Forward - Steps the cine file forward one frame only.

Fast Forward - Hold down on the Forward selector for approximately one-second and the playback speed will double.

Fast Reverse - Hold down on the Reverse selector for approximately one-second and the playback speed will double.

Pausing the Cine File

1. Press on the playback image on the screen while the cine file playing, in the PLAY CST screen .

Perform a Quick Search Through a Cine

1. From the PLAY CST screen:
   a. Press slightly below the Memory Buffer Graphical Representation Bar.
   b. Gently hold down on the screen, then
   c. Scrub in the direction you wish the cine file to go, (right - backwards, left - forwards).

6.2.11 Viewing a MultiCine File Stored in the Type 1 Compact Flash Card

The following steps can be used to view cine files, using the Phantom Camera Control software, stored on a Phantom Miro eX1, Miro 1, Miro eX2, Miro 2, Miro eX4, or Miro 4, Type1 CompactFlash Card.

STEP-BY-STEP PROCEDURES

1. Remove the CompactFlash Card from the Phantom Miro camera.
2. Insert the CompactFlash Card into the CompactFlash Card reader.
3. Attach CompactFlash reader to the Phantom Control Unit.
4. Open the file:
   a. Via Phantom Camera Control software

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1) Start the Phantom Camera Control application.

NOTE

If no cameras are connected to the control unit, click the OK button in the following warning message window: This will place the software into Demonstration Mode.

2) Click on the File>Open Cine option.
3) When the Open Cine File dialogue window displays:
   a) Navigate to the CompactFlash drive.
   b) Select the cine file to be opened.
   c) Click the open button.

b. Via Phantom Control Unit Desktop
   1) Right-mouse click on the My Computer Icon, or click Start>My Computer.
   2) Double-click the CompactFlash Card Reader Drive.
   3) Right-Mouse click on the cine file to be open.
      a) Select the Open with command in the pop-up window
      b) In the Open With dialogue window:
         i. Locate and highlight "Control program for Phantom cameras", then
         ii. Click the OK button

6.2.12 Deleting a Stored Cine File

As mentioned earlier, deleting a stored cine file requires you to provide confirmation to delete the recorded frames prior to deleting the data stored in DRAM.

STEP-BY-STEP PROCEDURE

1. Press the Delete Selector in the PLAY CST screen.
2. In the Delete Existing Recording Confirmation Screen press the Yes selector to delete the stored cine file.

RESULT: Once the stored cine file is deleted the camera will return to the LIVE PRE screen.

a. Press the No selector to continue.

CAUTION

Once a cine file is deleted it cannot be recovered. Be sure to save any cine file you wish to keep before deleting the cine file.

6.2.13 Editing a Stored Cine File

As mentioned earlier in this file, many recorded cine files contain a lot of unnecessary information both before and after the actual motion of interest. The Edit/Save Display allows you to edit unnecessary images from the beginning and the end of the recorded image data presently stored in the camera's DRAM buffer prior to saving the cine. Editing the cine will create smaller files, reduces file save times, and make cine playbacks more interesting.

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STEP-BY-STEP PROCEDURE

Accessing the Edit/Save screen

1. Press the Edit/Save Selector in the PLAY CST screen.

Setting the Mark In Point

1. From the Edit/Save screen:
   a. Locate the first frame you wish the cine file to begin with.
      1) Press a little below the Memory Buffer Graphical Representation Bar, and
      2) Hold down on the screen, then
      3) Scrub in the direction you wish the cine file to go, (right - backwards, left - forwards).
   b. Set the Mark In Point.
      1) Press the Set In Selector.

RESULT: On the Memory Buffer Graphical Representation Bar, an In Point Marker moves to that point.

Setting the Mark Out Point

1. From the Edit/Save screen:
   a. Locate the last frame you wish the cine file to end with.
      1) Press a little below the Memory Buffer Graphical Representation Bar, and
      2) Hold down on the screen, then
      3) Scrub forward, (left), to the image in the cine you wish the cine to end with.
   b. Set the Mark Out Point.
      1) Press the Set Out Selector.

RESULT: On the Memory Buffer Graphical Representation Bar an Out Point Marker moves to that point.

Resetting the Mark In and Mark Out Points

1. Press the Reset Selector in the Edit/Save screen.

RESULT: The In Point Marker and the Out Point Marker return to the beginning and the end of the record cine file.

6.2.14 Saving a Cine File

As mentioned earlier, saving a cine file requires you to provide confirmation prior to saving the cine file stored in DRAM of the camera.

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NOTE

The cine file will be saved to the camera's removable non-volatile Type 1 CompactFlash Card when saved using the LCD display. To save the cine file to an external storage device, such as the Phantom Control Unit, you will need to save the cine file using the Phantom Camera Control software. For details on using the Phantom Camera Control software to save the cine to an external storage device, click the following link: Step-by-Step Processes>Play Control Panel Procedures>Saving a Cine File.

STEP-BY-STEP PROCEDURE

Accessing the Save Screen

1. Press the Save Selector in the Edit/Save Screen.

Save the Cine File to the CompactFlash

1. Verifying that there is enough memory on the CompactFlash Card to save the cine file.
   a. Compare the:
      1) Size of the cine, located just to right of the (Number of) Frames of the cine file to be saved, in a parenthesis. The size of the cine is displayed in megabytes, with the
      2) Available Free Space on the Compact Flash Card, also displayed in megabytes.
   b. Ensure that the Size of the Cine to save does not exceed the amount of available Free Space on the Compact Flash card.
      1) If there is enough Free Space on the CompactFlash Card press the Save Selector.
      2) If there is not enough room on the CompactFlash Card to save the cine file:
         a) Replace the CompactFlash Card with one that has enough space available.
         b) Press the Save Selector, alternately
         c) Connect the camera to the Phantom Control Unit and use the Phantom Camera Control software to save the cine file to an external storage device. For details on using the Phantom Camera Control software to save the cine to an external storage device, click the following link: Step-by-Step Processes>Play Control Panel Procedures>Saving a Cine File.

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6.2.15 Power Off the Camera

STEP-BY-STEP PROCEDURE

1. Press Power Off selector from the Power Off Display.
2. In the Power Off Confirmation Screen:
   a. Press the Yes selector to power off the camera.
   b. Press the No selector to continue.

CAUTION

All cine files must be deleted from the camera's memory buffer prior to performing the Power Off Procedure. If you fail to comply with this caution, the camera will not power down, it will continue to run until the life of the battery is exhausted.

6.2.16 Using MultiCine with a Phantom Miro Camera

In this topic, we will describe the steps to record MultiCine files to both the camera's DRAM or directly to the Type 1 CompactFlash Card via the touch-sensitive LCD screen. We will also describe the procedures to view, edit, and save MultiCine files from both.

NOTE

To view, edit, and save cine files stored directly to the Type 1CompactFlash card you will need to use the Phantom Camera Control software.

The Phantom Miro1 does not support the MultiCine feature.

STEP-BY-STEP PROCEDURES

Defining the Number of MultiCines (Memory Partitions)

1. Access the MultiCine Allocation Display.
   a. Gently tap on the Phantom logo, in the upper left-hand corner, of the Live PRE Display.
   b. In the Power Off Display screen gently tap on the ALLOC field.
2. In the MultiCine Allocation Display:
   a. Gently tap on the + (plus) symbol to add a memory segment, or - (minus) symbol to remove a memory partition.

RESULT: The LCD will display the number of cines, (partitions), the maximum number of frames that can be recorded to each memory segment, and the recording duration, (the amount of time it will take to record the frames at the specified sample rate.

   b. When the desired number of memory segments has been specified, gently tap on the DONE selector.

RESULT: The LCD will advance to the Reallocate Memory and Delete All Cines? Display.

3. In the Reallocate Memory... Display gently tap Yes to repartition the camera DRAM or No to

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return to the MultiCine Allocation Display screen.

Recording MultiCine Image Data to DRAM

There are two method of placing the camera into the Capture, (recording), state, via the:

1. Via Live PRE Display
   a. Gently tap on the Record Selector, located in the lower right-hand corner of the display.

RESULT: The Record Selector changes to the Trigger Selector, and the camera status changes from Live PRE to Live WT1, (if Cine 1, memory segment 1 has image data already recorded in it the camera will advance to the first free memory partition).

1. Via Cine Screen Display
   a. In the Live PRE Display gently tap on the Cines Selector.
   b. Gently tap on an unwritten to cine, (RDY segment), number you wish to start recording image data into.

RESULT: The cine number selected will change from the RDY, (Ready), State to the WTR, (Waiting for Trigger), State.

Recording MultiCine Image Data Directly to the Type 1 CompactFlash Card

1. Start the Phantom Camera Control application.
2. Open the Acquisition pull-down menu.
3. Select the Camera Options... command from the Acquisition menu.
4. In the Camera Options dialogue window>End of Recording Actions area:
   a. Place a check mark in the Save to HDD/CF enable box.
   b. Click the OK button.
5. Exit the Phantom Camera Control application.

Triggering a MultiCine Partition

See: Phantom Miro Control via "Touch-Sensitive" LCD Screens>Step-by-Step Procedures>Triggering the Miro Camera.

Selecting a Specific MultiCine File Stored in DRAM to View, Edit, Save, or Delete

1. From the Cine Screen Display gently tap on the cine, (STR segment), number you wish to view, edit, save, or delete.

RESULT: The LCD will advance to the Play CST Display.

   a. To View a specific MultiCine cine follow the steps described in the Phantom Miro Control via "Touch-Sensitive" LCD Screens>Step-by-Step Procedures>Viewing a Stored Cine File.

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b. To Edit a specific MultiCine follow the steps described in the Phantom Miro Control via "Touch-Sensitive" LCD Screens>Step-by-Step Procedures>Editing a Stored Cine File.

c. To Delete a specific MultiCine follow the steps described in the Phantom Miro Control via "Touch-Sensitive" LCD Screens>Step-by-Step Procedures>Deleting a Stored Cine File.

Deleting All MultiCine Files Stored in DRAM

1. From the Cine Screen Display gently tap on the Delete All Selector.
2. In the Delete All Cines? Display gently tap Yes to delete all MultiCine recorded to the partitioned DRAM, or click No to return to the Cine Screen Display.

6.2.17 Using Image-Based Auto-Trigger with a Phantom Miro

WARNING

The Image-Based Auto-Trigger feature should never be used in applications where missed or false triggers cannot be tolerated or where a false trigger could cause harm to people or property.

The hardware signaling available in some Image-Based Auto-Trigger modes should be used only to synchronize multiple Phantom cameras together and should never be used to trigger or control any other external device or event.

CONSEQUENCES RESULTING FROM SYSTEM FAILURE, FALSE TRIGGERING OR MISUSE OF THIS FEATURE ARE THE SOLE RESPONSIBILITY OF THE USER.

Introduction

The Image-Based Auto-Trigger feature allows the user to trigger the camera from the motion detected in the live image.

General Operation

The Image-Based Auto-Trigger feature allows selected Phantom camera models, (Miro 2, Miro eX 2 (optional), Miro 4, and Miro eX 4, to trigger themselves when the image changes in a selectable region of the frame.

A few user definable parameters allow the auto-trigger behavior to be adjusted to operating conditions, filtering out unintended triggers due to vibration, changes in illumination, slow-moving shadows, etc.

The Auto-Trigger operation begins by the user selecting a rectangular area within the image, similar to the region used for auto-exposure, the Auto-Trigger region.

As each frame is captured, the image in the Auto-Trigger region is compared to an earlier copy of the same region that has been stored in a dedicated memory. After the comparison is made, the image in memory is updated to the current image, to be used in the future.

The result of the comparison determines if a trigger is generated. A pixel being compared is

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considered “active" if its level has changed, (brightened or darkened), by more than a preset threshold. The number of active pixels for a given frame is counted, and if it exceeds a set number, a trigger is generated. The required number of active pixels is specified as a percentage of the area of the Auto-Trigger region.

Image-Based Auto-Trigger Operating Modes

- Mode 0 - Image-Based Auto-Trigger is disabled.
- Mode 1 - Camera will drive both the auto-trigger and trigger itself when an auto-trigger is detected. If the auto-trigger signal is pulled low by an external device, the camera will be triggered.
- Mode 2 - The image changes are analyzed, and when an auto-trigger condition has been detected, the auto-trigger signal will be pulled low, as in Mode 1. However, the camera will not trigger itself. An external device pulling the auto-trigger signal low will not trigger the camera either.
- Mode 2 is useful when external control of the auto-trigger is desired, for instance, it is required that the auto-trigger feature is disabled for some known transient event). The auto-trigger signal from the camera will be routed through some external device and back into the trigger input of the camera.

STEP-BY-STEP PROCEDURES

1. Access the Power Off Display Screen.
2. From the Power Off Display Screen gently tap directly on the ATRIG field to open the Image-Based Auto-Trigger Display Screen.
3. In the Image-Based Auto-Trigger Display Screen select the desired Image-Based Auto-Trigger parameters, including:

Auto-Trigger Region

The Auto-Trigger Region allows the uses the center point of a user selectable region of the image, based on the image resolution setting. Selectable regions include:

- Center
- Top Left quadrant
- Top Right quadrant
- Bottom Left quadrant
- Bottom Right quadrant
- Custom Region (presently uses the same region as the Center option. However, it will be user definable region in the future. This region will be definable via the Phantom Camera Control Software interface.
- Full Screen

Sensitivity

The Sensitivity parameter defines both the:

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- Area - the percentage of the auto-trigger region that must be active in order for an auto-trigger event to be generated. A typical percentage value is 10.
- Threshold - the amount a pixel value must change in order to be counted as an active pixel for auto-trigger purposes. A value of 100 would require a change of approximately half of the full swing of the camera. A typical threshold setting would be 10.

A larger sensitivity setting means a lower area and threshold.

▼ Update

The Update, (Speed), Selector defines the number of frames between updates of the auto-trigger reference memory. A value larger than 1 allows the trigger to activate on slower events.

Image changes are evaluated over a time interval of auto-trigger speed/frame rate.

A larger update number will make the trigger slower as it will compare an image over more frames.

▼ Enable

Ensure the Image-Based Auto-Trigger is set to enable.

RESULT: Camera is set to use Image-Base Auto-Trigger feature.

Image-Based Auto-Trigger Region Tables

NOTES

X and Y defines the center of the auto-trigger region, relative to the center of the image size.

H specifies the height of the auto-trigger region. If zero the height will be either 1/4 of the image height, or 16 pixels, whichever is larger.

W specifies the width of the auto-trigger region. If zero the width will be either 1/4 of the image width, or 128 pixels, whichever is larger.

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AUTO-TRIGGER REGION BASED ON 800 X 600 IMAGE RESOLUTION				
VARIABLES	X	Y	W	H
CENTER	0	0	0	0
TOP LEFT	-200	-150	400	300
TOP RIGHT	200	-150	400	300
BOTTOM LEFT	-200	150	400	300
BOTTOM RIGHT	200	150	400	300
CUSTOM REGION	0	0	0	0
FULL SCREEN	0	0	800	600

AUTO-TRIGGER REGION BASED ON 640 X 480 IMAGE RESOLUTION				
VARIABLES	X	Y	W	H
CENTER	0	0	0	0
TOP LEFT	-160	-120	320	240
TOP RIGHT	160	-120	320	240
BOTTOM LEFT	-160	120	320	240
BOTTOM RIGHT	160	120	320	240
CUSTOM REGION	0	0	0	0
FULL SCREEN	0	0	640	480

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AUTO-TRIGGER REGION BASED ON 512 X 384 IMAGE RESOLUTION				
VARIABLES	X	Y	W	H
CENTER	0	0	0	0
TOP LEFT	-128	-96	256	192
TOP RIGHT	128	-96	256	192
BOTTOM LEFT	-128	96	256	192
BOTTOM RIGHT	128	96	256	192
CUSTOM REGION	0	0	0	0
FULL SCREEN	0	0	512	384

AUTO-TRIGGER REGION BASED ON 320 X 240 IMAGE RESOLUTION				
VARIABLES	X	Y	W	H
CENTER	0	0	0	0
TOP LEFT	-80	-60	160	120
TOP RIGHT	80	-60	160	120
BOTTOM LEFT	-80	60	160	120
BOTTOM RIGHT	80	60	160	120
CUSTOM REGION	0	0	0	0
FULL SCREEN	0	0	320	240

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AUTO-TRIGGER REGION BASED ON 256 X 192 IMAGE RESOLUTION				
VARIABLES	X	Y	W	H
CENTER	0	0	0	0
TOP LEFT	-64	-48	128	96
TOP RIGHT	64	-48	128	96
BOTTOM LEFT	-64	48	128	96
BOTTOM RIGHT	64	48	128	96
CUSTOM REGION	0	0	0	0
FULL SCREEN	0	0	256	192

AUTO-TRIGGER REGION BASED ON 160 X 120 IMAGE RESOLUTION				
VARIABLES	X	Y	W	H
CENTER	0	0	0	0
TOP LEFT	-40	-30	80	60
TOP RIGHT	40	-30	80	60
BOTTOM LEFT	-40	30	80	60
BOTTOM RIGHT	40	30	80	60
CUSTOM REGION	0	0	0	0
FULL SCREEN	0	0	160	120

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Image-Based Auto-Trigger Sensitivity Table

SENSITIVITY SETTING	REQUIRED ACTIVE AREA PERCENTAGE	PIXEL VALUE CHANGE THRESHOLD
1	50	20
2	10	20
3	5	10
4	2	10
5	1	10
CUSTOM	10	20

Image-Based Auto-Trigger Update Table

UPDATE	SPEED (NUMBER OF FRAMES BETWEEN UPDATES)
1	1
2	2
5	5
10	10
20	20
50	50
100	100
CUSTOM	1

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Part

7 Phantom 65 or Phantom HD Control via "On-Camera" Control Buttons

Updated: 3/18/2010

This module provides detailed information on how to control both the Phantom 65 and Phantom HD camera models via On-Camera Control buttons.

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7.1 Defining the Video Out Parameters

This topic provides information related to various procedures that must be performed, via the Phantom Video Player application, in order to use the "On-Camera" Control Buttons on either the Phantom 65 or Phantom HD camera models with an attached compatible monitor or sending the analog video output to an analog video storage device, such as a tape drive properly.

To define the video out parameters:

STEP-BY-STEP PROCEDURE

Via the Phantom Video Player Application

1. Open the Phantom Video Player application, by:
   a. Double-clicking on the PVP, (Phantom Video Player) icon, alternately
   b. Clicking on Start>All Programs>Phantom>Phantom Video Player option.
2. Selected a connected Phantom camera or Phantom CineStation, by:
   a. Clicking the down-arrow to the right of the Camera field, then
   b. Selecting the connected to Phantom camera or Phantom CineStation containing the cine file to be reviewed, edited, and/or saved.
3. Define the Video Out parameters:
   a. Click on the Settings Button.
   b. In the PVP Settings dialogue window:
      1) Select the Video System.
         a) Click the down-arrow to the right of the Video System field, then
         b) Select the video format that matches the attached monitor or viewfinder.
   c. Enable, (check), the Test Image enable box to display a calibration Test Bar image on the attached monitor, viewfinder, or recorder, (optional).
   d. Enable, (check), the Zoom 1:1 (for Live) enable box to display a 1:1 image on the attached monitor or viewfinder and facilitate a focus operation.
   e. Define the desired OSD options.
      1) Enable, (check), the Digital OSD, (Digital Output), or Analog OSD (Analog Output), enable box to display the On-Screen Display information from the attached monitor or viewfinder.
      2) Enable, (check), the OSD Opaque enable box to obtain a uniform gray background for the On-Screen Display information.
   f. Define the Video Outputs.

      For detailed descriptions of these Video Outs settings see: Functional Descriptions>Versatile Dual HD-SDI.

      1) Enable 4:4:4
      2) Click the Modes radio button to select if:
         a) All outputs play the selected cine, or
         b) SDI2 plays the selected cine and Analog and SDI1 plays Live.
   g. Modify the Adjust parameters to get a proper image on the attached monitor or viewfinder,

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including:

1) Brightness
2) Gain
3) Gamma
4) Saturation
5) Hue
6) Press the Defaults button to reset the Adjust parameters back to their default values.

7.2 The Monitor/ViewFinder Display Screens

The information displayed in the OSD (On-Screen Display) can vary based on how the user defines what information he/she desires via the Phantom Video Player - Help>Using the Phantom Video Player Application>Define the Video Out Parameters pull-down selection list.

Below are the various display screens, we will cover in this section:

1. LIVE PRE Display Screens (without/with Phantom CineMag attached)
2. SETUP Display Screens (without/with Phantom CineMag attached)
3. LIVE WTR Display Screens (without/with Phantom CineMag attached)
4. LIVE TRG Display Screens (without/with Phantom CineMag attached)
5. LIVE CST Display Screens (without/with Phantom CineMag attached)
6. SELECT Display Screens (without/with Phantom CineMag attached)
7. PLAY CST Display Screens (without/with Phantom CineMag attached)

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7.2.1 LIVE PRE/LIVE Display Screens

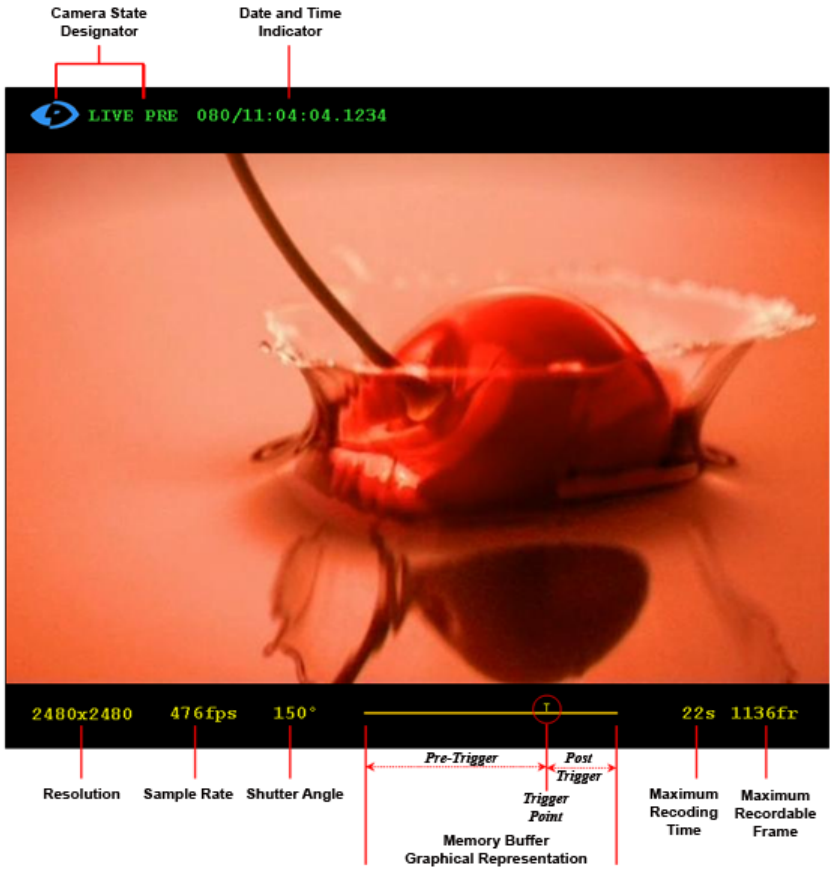
The LIVE PRE, (live image preview, waiting for pretrigger), mode is the operational state the camera will start up in when it is first powered up. When the camera has a Phantom CineMag attached, and it is set in Run/Stop mode the camera will be placed into the LIVE mode. What this means is, in either mode, the camera will display a live image on the monitor or viewfinder screen. However, the camera is not yet recording any image data or frames to the camera memory buffer or Phantom CineMag.

In this state, the user can:

- View a live image to focus in on the subject.
- Zoom in 1:1 pixel view to assist in targeting the subject.
- Define the recording parameters.
- Determine if any image area is over exposed.
- Examine the recording duration time and the number of frames that will be recorded within the recording time frame.

THE ON-SCREEN DISPLAY FIELDS

Without an Attached Phantom CineMag



LIVE - Live Preview Mode Display Screen without an attached Phantom CineMag

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Below is a brief description of the information that could be displayed in the LIVE PRE display screen:

Camera State Designators

The camera state designation is comprised of two items; the Phantom logo and text display. The color of the Phantom logo will change based on the state of the camera. The Phantom logo will be cyan (blue) when the camera is in the LIVE PRE mode. The text, to the right of the Phantom logo, indicates the present state or operational mode of the camera.

Date and Time

The date and time stamp field indicates; day number/hour:minute:second:microsecond.

Resolution

This field indicates the active pixel area, (Width x Height), of the sensor defined by the user.

Sample Rate

This field specifies the rate the Phantom camera will capture or record image data, (frames), into the camera's memory.

Shutter Angle

This field shows the current, user defined, Shutter Angle or exposure setting of the camera.

Memory Buffer Graphical Representation

This is a graphical representation of the camera's memory buffer. It acts as a memory gauge that consists of two basic components when the camera is in the LIVE PRE state.

The first component, of the graphical representation is the line which represents the total frames that can be stored in the camera,s buffer. The second component is a "T" on top of the line. The "T" represents a trigger point that is defined by the user. Any frames that are captured after a trigger signal is detected by the camera are referred to as Post Trigger frames, and the frames recorded prior to the trigger signal are referred to as Pre-Triggered frames.

Maximum Recording Time

This field indicates the total length of recording time. The recording duration is based on the amount of memory in the camera, along with the resolution and sample rate settings. This field will change based on these variables.

Maximum Recordable Frames

This field indicates how many images or frames will be recorded within the Duration time. This field will also change based on how the amount of memory in the camera, and how the resolution, and sample rate are set and will change accordingly.

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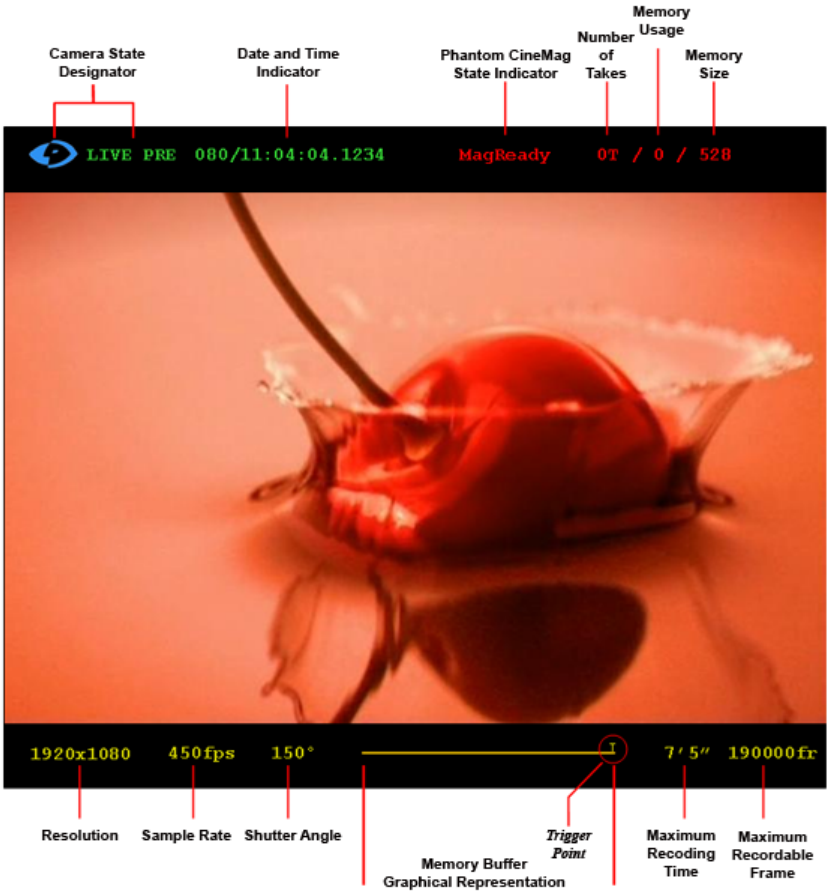
With an Attached Phantom CineMag



LIVE - Live Preview Mode Display Screen with an attached Phantom CineMag

Below is a brief description of the information that could be displayed in the display screen:

Camera State Designator

The camera state designation is comprised of the Phantom logo. The color of the Phantom logo will change based on the state of the camera. The Phantom logo will be cyan (blue) when the camera is in the LIVE mode.

Date and Time

The date and time stamp field indicates; day number/hour:minute:second:microsecond.

Phantom CineMag Status Indicator

The Camera State Designator indicates the operation state of the camera. Various state designators include:

MagInit

Indicates the Phantom CineMag has been detected either during camera power-up, or when a Phantom CineMag has been inserted onto the camera.

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MagScan

Indicates that the Phantom CineMag is running through it power-up, self-diagnostics routines.

MagReady

Indicates that the Phantom CineMag has passed its power-up, self-diagnostics routines.

MagErase

Indicates that the Phantom CineMag has been instructed to erase its contents, and is performing the erasure procedure.

Number of Takes

This field indicates the number of takes or cine files, (movies), recorded to the Phantom CineMag. As takes are recorded the Number of Takes field increments.

Memory Usage

This field indicates the amount of bytes used to store recorded frames. As takes are recorded the Memory Usage field increments.

Memory Size

This field indicates the total number of bytes, or the memory size, of the Phantom CineMag.

Resolution

This field indicates the active pixel area, (Width x Height), of the sensor defined by the user.

Sample Rate

This field specifies the rate the Phantom camera will capture or record image data, (frames), into the camera's memory.

Shutter Angle

This field shows the current, user defined, Shutter Angle or exposure setting of the camera.

Memory Buffer Graphical Representation

This is a graphical representation of the camera's memory buffer. It acts as a memory gauge that consists of two basic components.

The first component, of the graphical representation is the line which represents the total frames that can be stored in the camera,s buffer. The second component is a "T" on top of the line. The "T" represents a trigger point that is defined by the user. Any frames that are captured after a trigger signal is detected by the camera are referred to as Post Trigger frames, and the frames recorded prior to the trigger signal are referred to as Pre-Triggered frames.

Maximum Recording Time

This field indicates the total length of recording time. The recording duration is based on the amount of memory in the camera, along with the resolution and sample rate settings. This field will change based on these variables.

Maximum Recordable Frames

This field indicates how many images or frames will be recorded within the Duration time. This field will also change based on how the amount of memory in the camera, and how the resolution, and sample rate are set and will change accordingly.

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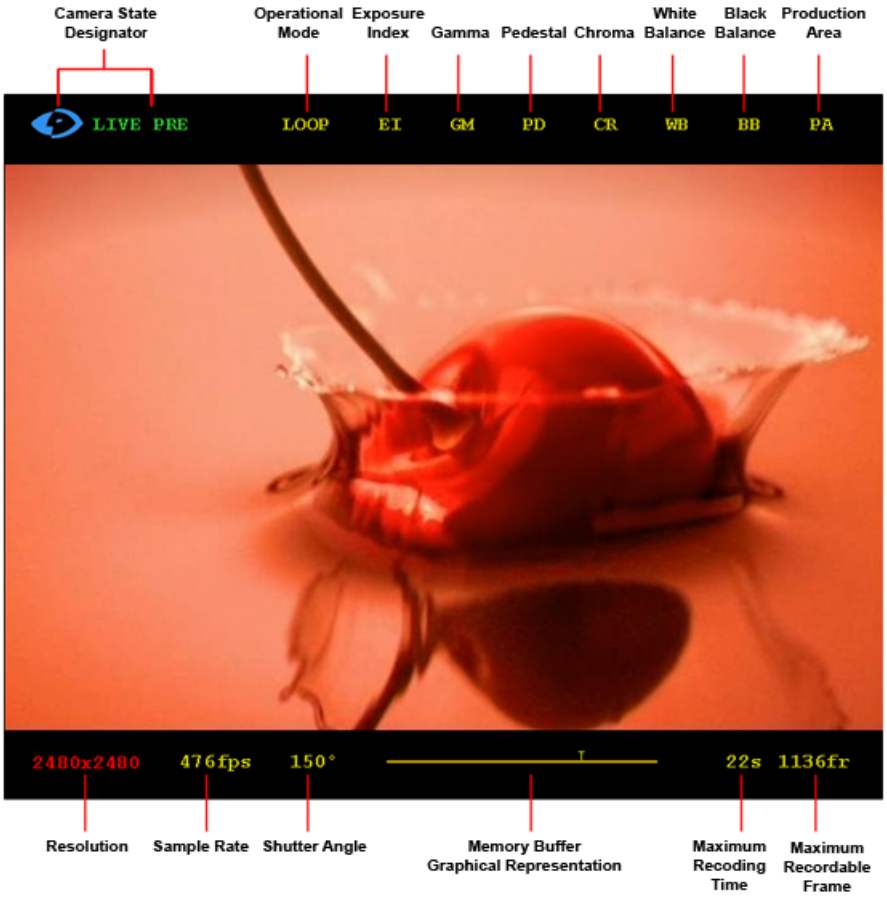
7.2.2 SETUP Display Screens

The Setup Display Screen can be access from either the LIVE PRE, LIVE (with CineMag attached and camera set in Run/Stop mode) or LIVE WTR display windows. It is in this set up display window the user will select various camera setup and recording parameters to record image data or frames, using the cameras On-Camera Control buttons.

THE ON-SCREEN DISPLAY FIELDS

Loop Mode



LIVE PRE Display - Setup Loop Mode

Below is a brief description of the fields that displayed on the screen:

Camera State Designators

As mention in the "LIVE PRE Display Screen - The On-Screen Display Fields" topic, earlier in this document, the camera state designation is comprised of two items; the Phantom logo and text display.

The setup and recording parameters that can be set via the On-Camera Controls are:

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Operational Mode

This filed is used to select if the camera is to run in either Loop or Run/Stop Mode.

In the Loop Mode, the camera stores the recorded image data into the camera's DRAM buffer. In this mode, the Phantom CineMag operates like any other Flash card, after a cine file is recorded into the camera's DRAM frame buffer, you can manually save it into the CineMag using the "Flash Memory" dialogue window which can be accessed in either the Setup and Recording or ViewCine dialogue windows.

In Run/Stop Mode the image data is recorded, up to 450fps at HD resolution (2048 x 1080), directly into the Phantom CineMag.

EI (Exposure Index)

An amount by which it is possible to over or underexpose a light sensitive material and, with standard processing, still produce acceptable results. By referring to the exposure index in the viewfinder and working in stops, you can fine tune your exposure.

GM (Gamma)

Gamma is the nonlinear relationship between signal level and brightness output of pixels, (a small signal level change at low voltage produces a larger variation in brightness than the same change in level at high voltage); gamma correction for monitors is the compensation for this non-linearity. In the Phantom camera gamma adjustment is used to bring out details of the image. One can think of that gamma adjustment as selective contrast adjustment.

PD (Pedestal)

Used to change the voltage level corresponding to black or to the maximum limit of black peaks.

CR (Chroma)

Short for chrominance, is the attributes of a color, which include its hue (frequency) and saturation (amount of black).

WB (White Balance)

This process is used to balance the active pixels of the image sensor to the overall color temperature of the lighting. The user only needs to perform a white balance at the beginning of the day or when a major change occurs in the lighting, such as going from indoors to outdoors , or using a different setup with color gel on the lights.

BB (Black Balance)

This process is used to remove any inconsistencies between pixels that make up the active pixel area of a camera's sensor. There are two common unwanted effects in all silicon sensors that can seriously reduce the quality of the images recorded, they are:

Fixed Pattern Noise

Also known as spatial noise. It is the unwanted variation of the response of all pixels in the image. It is expressed as an offset in volts or in Analog-to-Digital Conversion (ADC) bits. It does not vary with time.

Photo Response Non-Uniformity

The fact that each, individual, photo diode or pixel has a different amplification factor or gain. It is a different flavor of FPN (Fixed Pattern Noise).

Both unwanted sensor byproducts are corrected, electronically, when a black balance is performed.

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PA (Production Area)

The camera will highlight the production area specified by under exposing the area outside the production area by 1-stop, and changing it to be monochrome. This production area can be though as the area of the captured image that will be used in the final production.

Resolution

Resolution refers to the shape of the captured area in pixels. It represents the number of pixels enabled to capture an image. For example, if 800x600 is set, the full sensor space available, it is called 'Full Frame'.

The Resolution setting allows the user to change the dimensions, or aspect ratio, of the sensors active pixel area. The aspect ratio is the width to the height ratio of the image being recorded. Each type of camera has a specific maximum resolution.

Changing the Resolution settings to match the dimensions of the subject of interest allows the user the option of recording at higher sample rates, or longer recording times at the same sample rate. Smaller resolutions ‘crop’ the capture image by enabling a subset of pixels, this allows you to customize the shape of the capture area to the application. For example, if you are capturing a linear environment such as a rocket car, you do not need to capture the static sky above and ground below the subject.

Sample Rate

The Sample Rate is the rate at which images are recorded. The Sample Rate field selection list will change according to the Resolution selected. The larger the selection area the lower the maximum frame rate.

NOTE

Set the Resolution before setting the Sample Rate. To set high sample rates, or increase the recording time, reduce the selected Resolution (Width x Height).

Shutter Angle

Adjusting the shutter angle affects the amount of time that sensor is exposed to light. A larger shutter angle may result in an increased motion blur on moving objects.

Post Trigger (via Memory Buffer Graphical Display)

The Post Trigger value represents how many pictures will be recorded after the trigger signal is detected by the Phantom camera. Since the memory is scrolling memory, the Post Trigger value also sets the number of pre-trigger images captured.

When a Post Trigger value is defined in the Phantom Camera Control software, the camera will continue to record and store, to the camera’s DRAM buffer, image data after a trigger signal is detected for n fames, where n is the number of post trigger frames specified.

After the trigger signal is detected by the camera, recording continues for an exact number of frames, n, and stored in the image buffer, then recording stops; n will depend on the number of post trigger frames defined by the user.

It’s important to note that the camera can only store a finite number of images into the memory buffer based on the resolution, sample rate, image bit depth settings, and the memory size.

When a post trigger value has been defined the camera will only store the maximum image count allowed, for the particular capture settings. The camera will only display the frames stored in the memory buffer, the last x images, where x is the total number of images recorded or stored in the image buffer.

At this point, the recorded images can be viewed or saved into a file on the Phantom Control Unit or, optionally saved to Phantom CineMag memory magazine.

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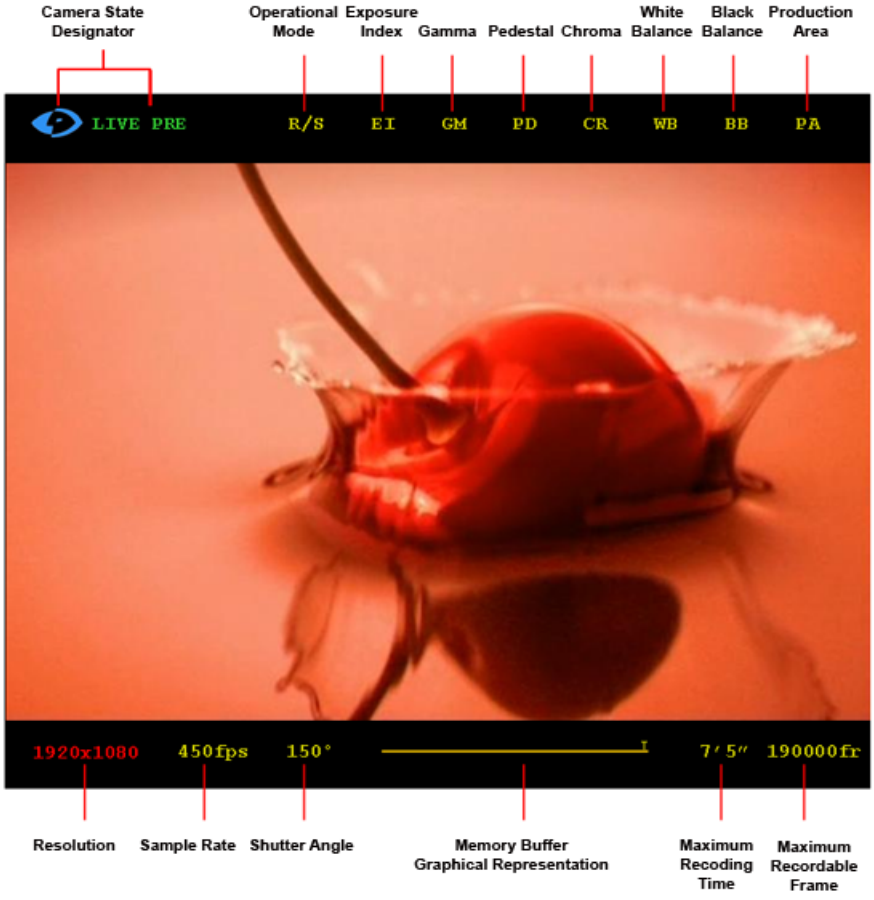
Maximum Recording Time

This field indicates the total length of recording time. The recording duration is based on the amount of memory in the camera, along with the resolution and sample rate settings. This field will change based on these variables.

Maximum Recordable Frames

This field indicates how many images or frames will be recorded within the Duration time. This field will also change based on how the amount of memory in the camera, and how the resolution, and sample rate are set and will change accordingly.

R/S (Run/Stop Mode)



LIVE Display - Setup R/S (Run/Stop) Mode

Below is a brief description of the fields that displayed on the screen:

Camera State Designator

As mention in the "LIVE PRE Display Screen - The On-Screen Display Fields" topic, earlier in this document, the camera state designation is comprised of two items; the Phantom logo and text display (LIVE when in R/S mode).

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The setup and recording parameters that can be set via the On-Camera Controls are:

Operational Mode

This filed is used to select if the camera is to run in either Loop or Run/Stop Mode.

In the Loop Mode, the camera stores the recorded image data into the camera's DRAM buffer. In this mode, the Phantom CineMag operates like any other Flash card, after a cine file is recorded into the camera's DRAM frame buffer, you can manually save it into the CineMag using the "Flash Memory" dialogue window which can be accessed in either the Setup and Recording or ViewCine dialogue windows.

In Run/Stop Mode the image data is recorded, up to 450fps at HD resolution (2048 x 1080), directly into the Phantom CineMag.

EI (Exposure Index)

An amount by which it is possible to over or underexpose a light sensitive material and, with standard processing, still produce acceptable results. By referring to the exposure index in the viewfinder and working in stops, you can fine tune your exposure.

PD (Pedestal)

Used to change the voltage level corresponding to black or to the maximum limit of black peaks.

CR (Chroma)

Short for chrominance, is the attributes of a color, which include its hue (frequency) and saturation (amount of black).

WB (White Balance)

This process is used to balance the active pixels of the image sensor to the overall color temperature of the lighting. The user only needs to perform a white balance at the beginning of the day or when a major change occurs in the lighting, such as going from indoors to outdoors , or using a different setup with color gel on the lights.

BB (Black Balance)

This process is used to remove any inconsistencies between pixels that make up the active pixel area of a camera's sensor. There are two common unwanted effects in all silicon sensors that can seriously reduce the quality of the images recorded, they are:

Fixed Pattern Noise

Also known as spatial noise. It is the unwanted variation of the response of all pixels in the image. It is expressed as an offset in volts or in Analog-to-Digital Conversion (ADC) bits. It does not vary with time.

Photo Response Non-Uniformity

The fact that each individual photo diode or pixel has a different amplification factor or gain. It is a different flavor of FPN (Fixed Pattern Noise).

Both unwanted sensor byproducts are corrected, electronically, when a black balance is performed.

PA (Production Area)

The camera will highlight the production area specified by under exposing the area outside the production area by 1-stop, and changing it to be monochrome. This production area can be though as the area of the captured image that will be used in the final production.

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Resolution

Resolution refers to the shape of the captured area in pixels. It represents the number of pixels enabled to capture an image. For example, if 800x600 is set the full sensor space available it is called “Full Frame.”

The Resolution setting allows the user to change the dimensions, or aspect ratio, of the sensors active pixel area. The aspect ratio is the width to the height ratio of the image being recorded. Each type of camera has a specific maximum resolution.

Changing the Resolution settings to match the dimensions of the subject of interest allows the user the option of recording at higher sample rates, or longer recording times at the same sample rate. Smaller resolutions ‘crop’ the capture image by enabling a subset of pixels, this allows you to customize the shape of the capture area to the application. For example, if you are capturing a linear environment such as a rocket car, you do not need to capture the static sky above and ground below the subject.

Sample Rate

The Sample Rate is the rate at which images are recorded. The Sample Rate field selection list will change according to the Resolution selected. The larger the selection area the lower the maximum frame rate.

NOTE

Set the Resolution before setting the Sample Rate. To set high sample rates, or increase the recording time, reduce the selected Resolution (Width x Height).

Shutter Angle

Adjusting the shutter angle affects the amount of time that sensor is exposed to light. A larger shutter angle may result in an increased motion blur on moving objects.

Post Trigger (via Memory Buffer Graphical Display)

The Post Trigger value represents how many pictures will be recorded after the trigger signal is detected by the Phantom camera.

NOTE

Since the Phantom CineMag memory is a linear memory buffer, the Post Trigger value will be automatically set to 1.

Maximum Recording Time

This field indicates the length of recording time left. The recording duration is based on the amount of memory in the camera, along with the resolution and frame rate settings. This field will change based on these variables. As takes are recorded the Total Time Available will decrease in real time.

Maximum Recordable Frames

This field indicates how many images or frames can still be recorded into the Phantom CineMag. As takes are recorded the Total Frames Available will decrease in real time.

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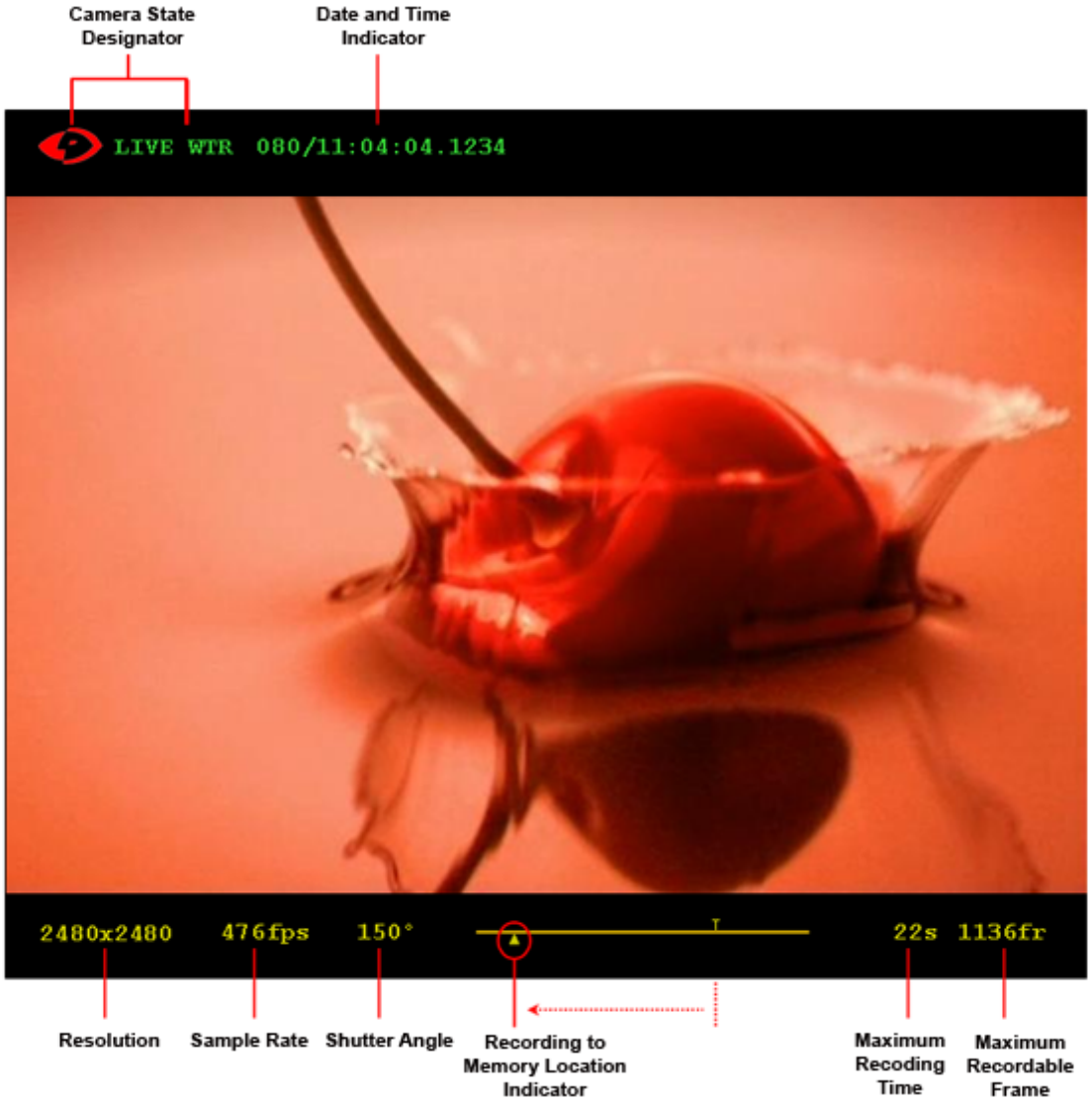
7.2.3 LIVE WTR/LIVE REC Display Screens

The LIVE WTR / LIVE REC (live image preview, waiting for trigger) mode, is the operational state the camera will be in once the camera has been instructed to capture or record the image data or frames to the camera's memory buffer or directly into the Flash memory of an attached Phantom CineMag.

When the camera is set to the Loop Operational Mode, the camera continues to display a live image on a monitor or viewfinder screen, just as it did when the camera was in the LIVE PRE mode. The camera will continue to capture or write image data into the camera scrolling memory buffer locations until a trigger signal has been sent and detected by the camera.

When set to the R/S (Run/Stop) Mode – LIVE REC, the camera displays a live image on a monitor or viewfinder screen, and starts writing image data directly into the Phantom CineMag linear buffer until a trigger signal has been sent and detected by the camera.

THE ON-SCREEN DISPLAY FIELDS



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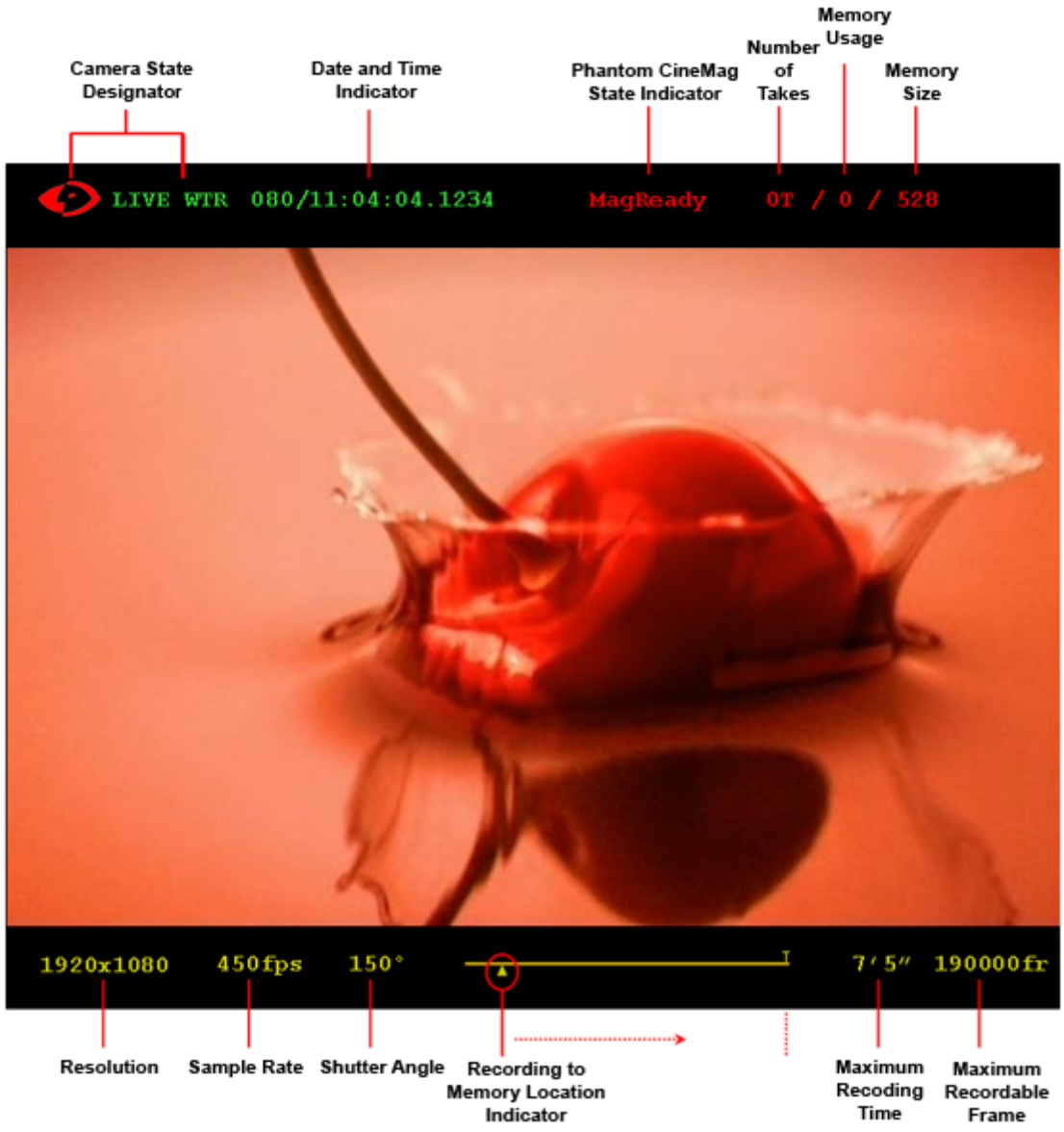
LIVE WTR Display - Recording, Waiting for Trigger Mode without an attached Phantom CineMag



LIVE WTR Display - Recording, Waiting for Trigger Mode with an attached Phantom CineMag

Below is a brief description of the fields that displayed on the screen:

Camera State Designators

The Phantom logo will be red when the camera is in the LIVE WRG mode.

Date and Time

The date and time stamp field indicates; day number/hour:minute:second:microsecond.

Phantom CineMag Status Indicator

The Camera State Designator indicates the operation state of the camera. Various state

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designators include:

MagInit

Indicates the Phantom CineMag has been detected either during camera power-up, or when a Phantom CineMag has been inserted onto the camera.

MagScan

Indicates that the Phantom CineMag is running through it power-up, self-diagnostics routines.

MagReady

Indicates that the Phantom CineMag has passed its power-up, self-diagnostics routines.

MagErase

Indicates that the Phantom CineMag has been instructed to erase its contents, and is performing the erasure procedure.

Number of Takes

This field indicates the number of takes or cine files, (movies), recorded to the Phantom CineMag. As takes are recorded the Number of Takes field increments.

Memory Usage

This field indicates the amount of bytes used to store recorded frames. As takes are recorded the Memory Usage field increments.

Memory Size

This field indicates the total number of bytes, or the memory size, of the Phantom CineMag.

Resolution

This field indicates the active pixel area, (Width x Height), of the sensor defined by the user.

Sample Rate

This field specifies the rate the Phantom camera will capture or record image data, (frames), into the camera's memory.

Shutter Angle

This field shows the current, user defined, Shutter Angle or exposure setting of the camera.

Memory Buffer Graphical Representation

The graphical representation of the camera's memory buffer, which acts as a memory gauge will display a Recording to Memory Location Indicator, (an up-arrow), that will scroll backwards from the trigger point, (T), indicating that the memory buffer is in the process of being filled the moment the camera has been placed into the LIVE WTR mode.

When the indicator reaches the beginning of the line the camera's memory buffer is full. This does not mean that the camera stops recording since the camera utilizes a scrolling buffer technique to fill the buffer. What this means is that the camera writes the captured image data or frame into the first available memory location, the second frame into the second available memory location, and so on until all available memory locations have been written into with image data or frames. Once all the memory locations have been written into the next frame that is captured will overwrite the image data that is presently stored in that first memory location, the next frame overwrites the next location and so on. This process of overwriting memory locations will continue until a trigger signal has been detected by the camera and any user defined post trigger frame requirements have been recorded. It is only at this point the camera will stop overwriting the captured images or frame stored in the memory buffer.

Recording to Memory Location Indicator

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The up-arrow is a graphical representation of the memory location the displayed image will be stored into.

Maximum Recording Time

This field indicates the total length of recording time. The recording duration is based on the amount of memory in the camera, along with the resolution and sample rate settings. This field will change based on these variables.

Maximum Recordable Frames

This field indicates how many images or frames will be recorded within the Duration time. This field will also change based on how the amount of memory in the camera, and how the resolution, and sample rate are set and will change accordingly.

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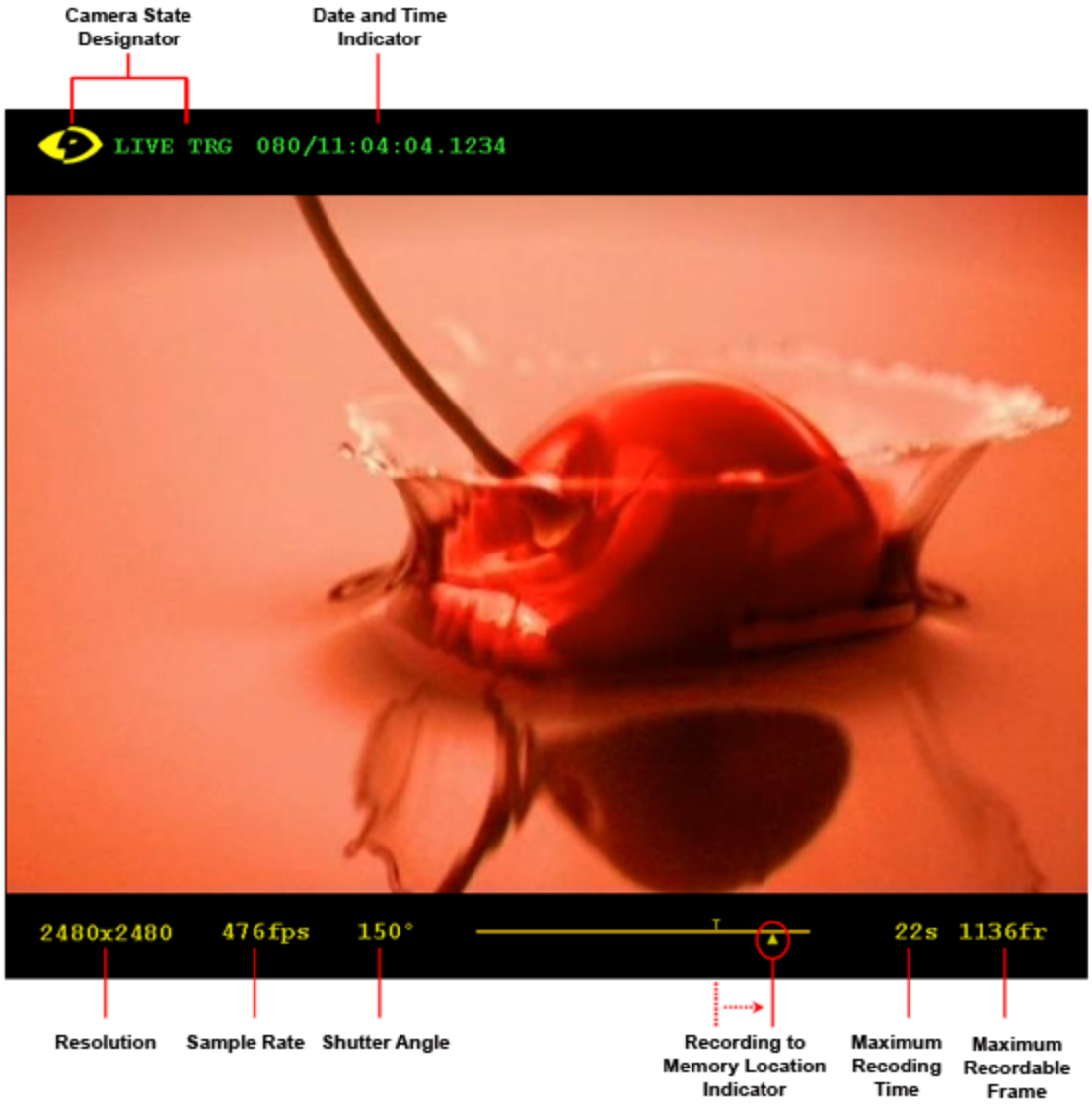
7.2.4 LIVE TRG Display Screen

The LIVE TRG, (live image preview, camera triggered) mode, is the operational state the camera will be in when once the camera has detected a valid trigger signal. The camera continues to display a live image on a monitor or viewfinder screen, just as it did when the camera was in the LIVE PRE or LIVE WTR modes.

In Loop Mode the camera will stop capturing or writing image data into the camera scrolling memory buffer locations upon receipt of the trigger signal once the user defined post trigger definition, if any, has been satisfied.

In R/S (Run/Stop) Mode the camera will immediately stop capturing or writing image data into the Phantom CineMag Flash memory locations upon the receipt of the trigger signal.

THE ON-SCREEN DISPLAY FIELDS



LIVE TRG Display - Camera Triggered Mode without an attached Phantom CineMag

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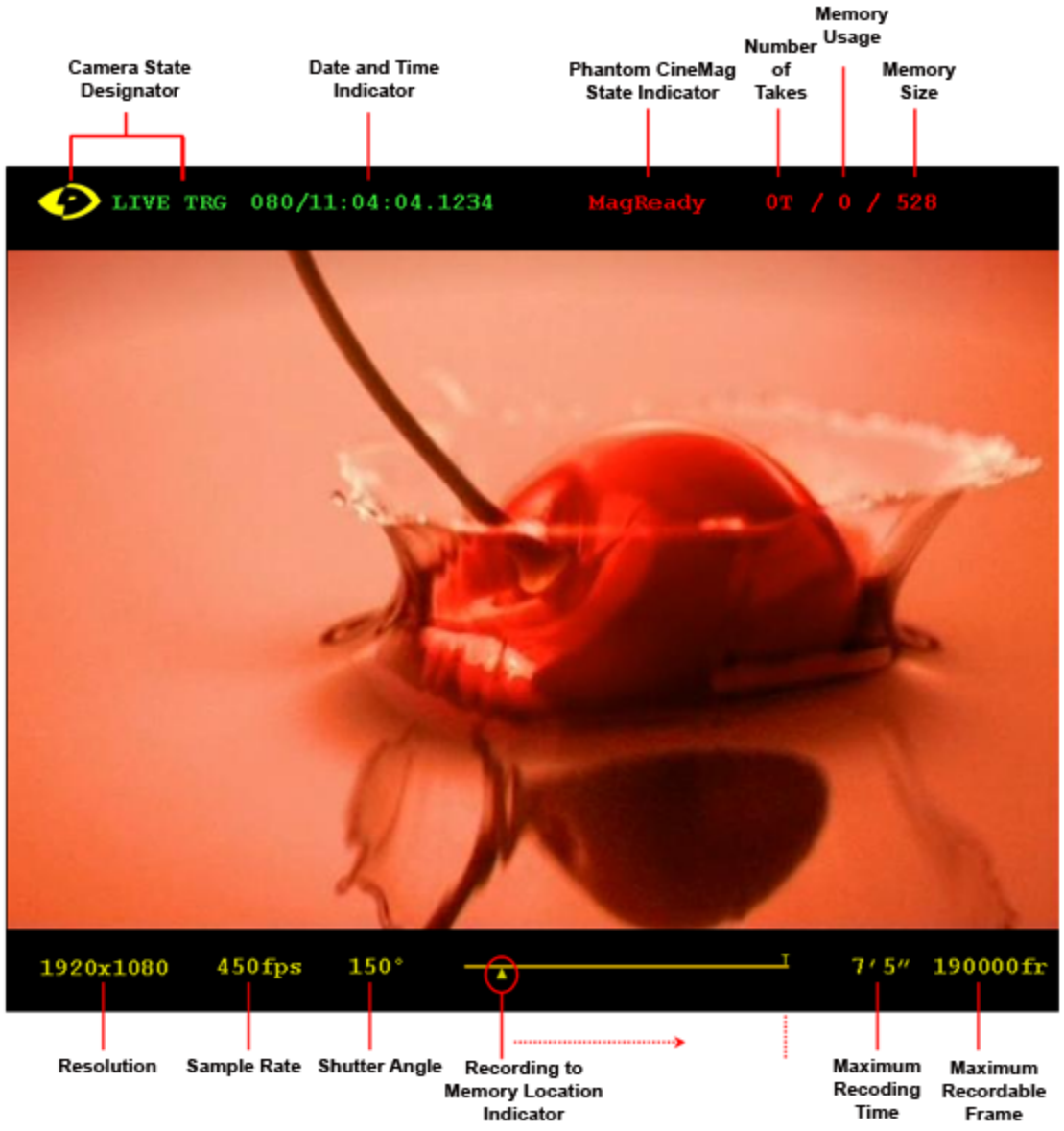

LIVE TRG Display - Camera Triggered Mode with an attached Phantom CineMag

Below is a brief description of the fields that displayed on the screen:

Camera State Designators

The Phantom logo will be yellow when the camera is in the LIVE TRG mode.

Date and Time

The date and time stamp field indicates; day number/hour:minute:second:microsecond.

Phantom CineMag Status Indicator

The Camera State Designator indicates the operation state of the camera. Various state

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designators include:

MagInit

Indicates the Phantom CineMag has been detected either during camera power-up, or when a Phantom CineMag has been inserted onto the camera.

MagScan

Indicates that the Phantom CineMag is running through it power-up, self-diagnostics routines.

MagReady

Indicates that the Phantom CineMag has passed its power-up, self-diagnostics routines.

MagErase

Indicates that the Phantom CineMag has been instructed to erase its contents, and is performing the erasure procedure.

Number of Takes

This field indicates the number of takes or cine files, (movies), recorded to the Phantom CineMag. As takes are recorded the Number of Takes field increments.

Memory Usage

This field indicates the amount of bytes used to store recorded frames. As takes are recorded the Memory Usage field increments.

Memory Size

This field indicates the total number of bytes, or the memory size, of the Phantom CineMag.

Resolution

This field indicates the active pixel area, (Width x Height), of the sensor defined by the user.

Sample Rate

This field specifies the rate the Phantom camera will capture or record image data, (frames), into the camera's memory.

Shutter Angle

This field shows the current, user defined, Shutter Angle or exposure setting of the camera.

Memory Buffer Graphical Representation

The graphical representation of the camera's memory buffer, which acts as a memory gauge will display a Recording to Memory Location Indicator, (an up-arrow), will scroll forward from the trigger point, (T), indicating that the post trigger frames are being written into the camera's memory buffer.

When the indicator reaches the end of the line the camera's memory buffer is full, and the users defined post trigger frame requirements as been satisfied the camera stops recording image data or frames. Once this process has completed the camera will go into the LIVE CST, (live image preview, cine stored), mode.

Recording to Memory Location Indicator

The up-arrow is a graphical representation of the memory location the displayed image will be stored into.

Maximum Recording Time

This field indicates the total length of recording time. The recording duration is based on the amount of memory in the camera, along with the resolution and sample rate settings. This field

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will change based on these variables.

Maximum Recordable Frames

This field indicates how many images or frames will be recorded within the Duration time. This field will also change based on how the amount of memory in the camera, and how the resolution, and sample rate are set and will change accordingly.

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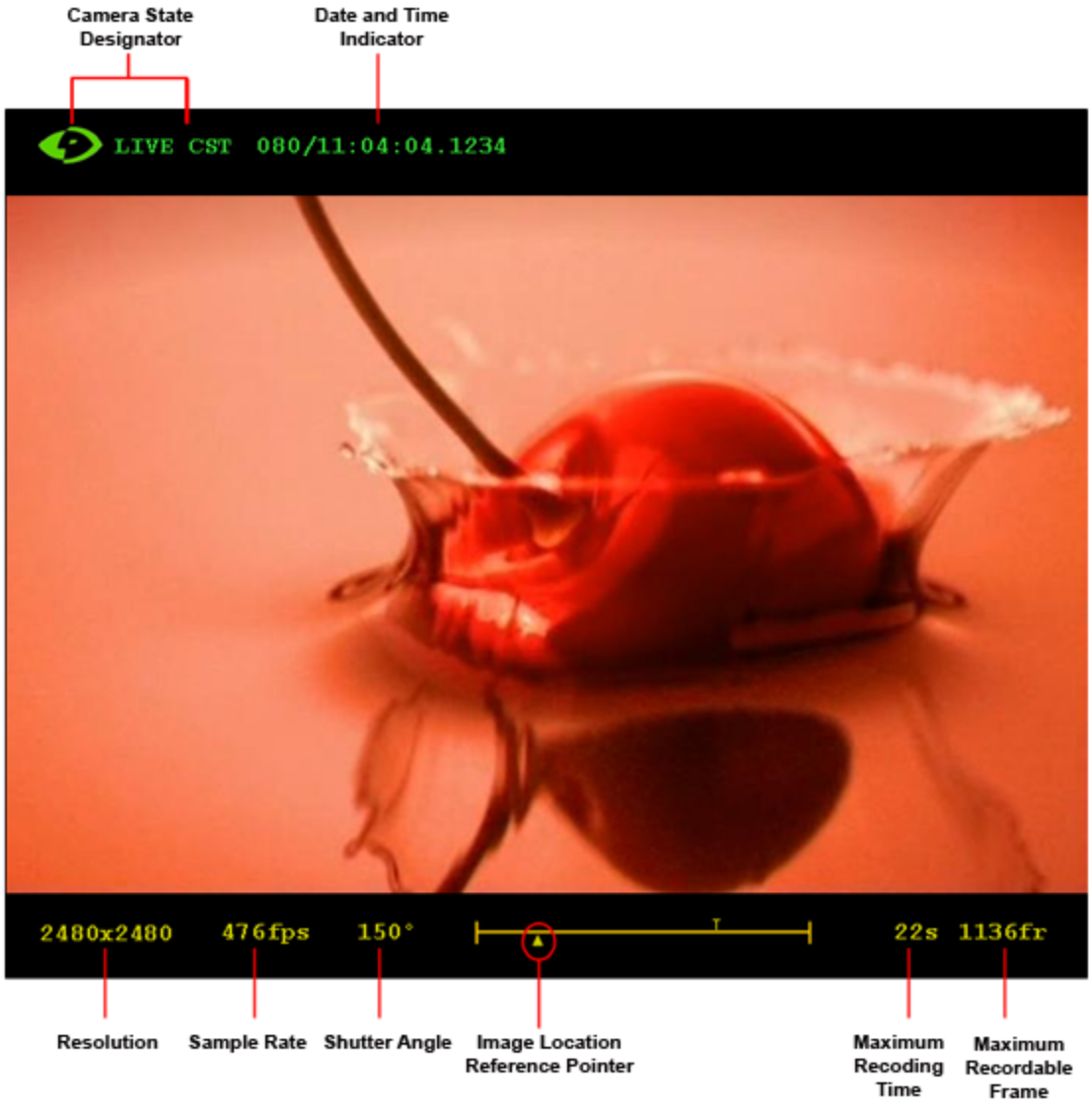
7.2.5 LIVE CST Display Screen

As mentioned in the "LIVE TRG Display Screen - The On-Screen Display Fields" topic, when the camera's memory buffer is full, and the user's defined post trigger frame requirements as been satisfied the camera stops recording image data or frames. Once this process has completed the camera will be placed into the LIVE CST, (live image preview, cine stored), mode, indicating that the camera has recorded a cine in its memory buffer for review, editing, and saving.

THE ON-SCREEN DISPLAY FIELDS



LIVE CST Display - Cine Stored Mode without an attached Phantom CineMag

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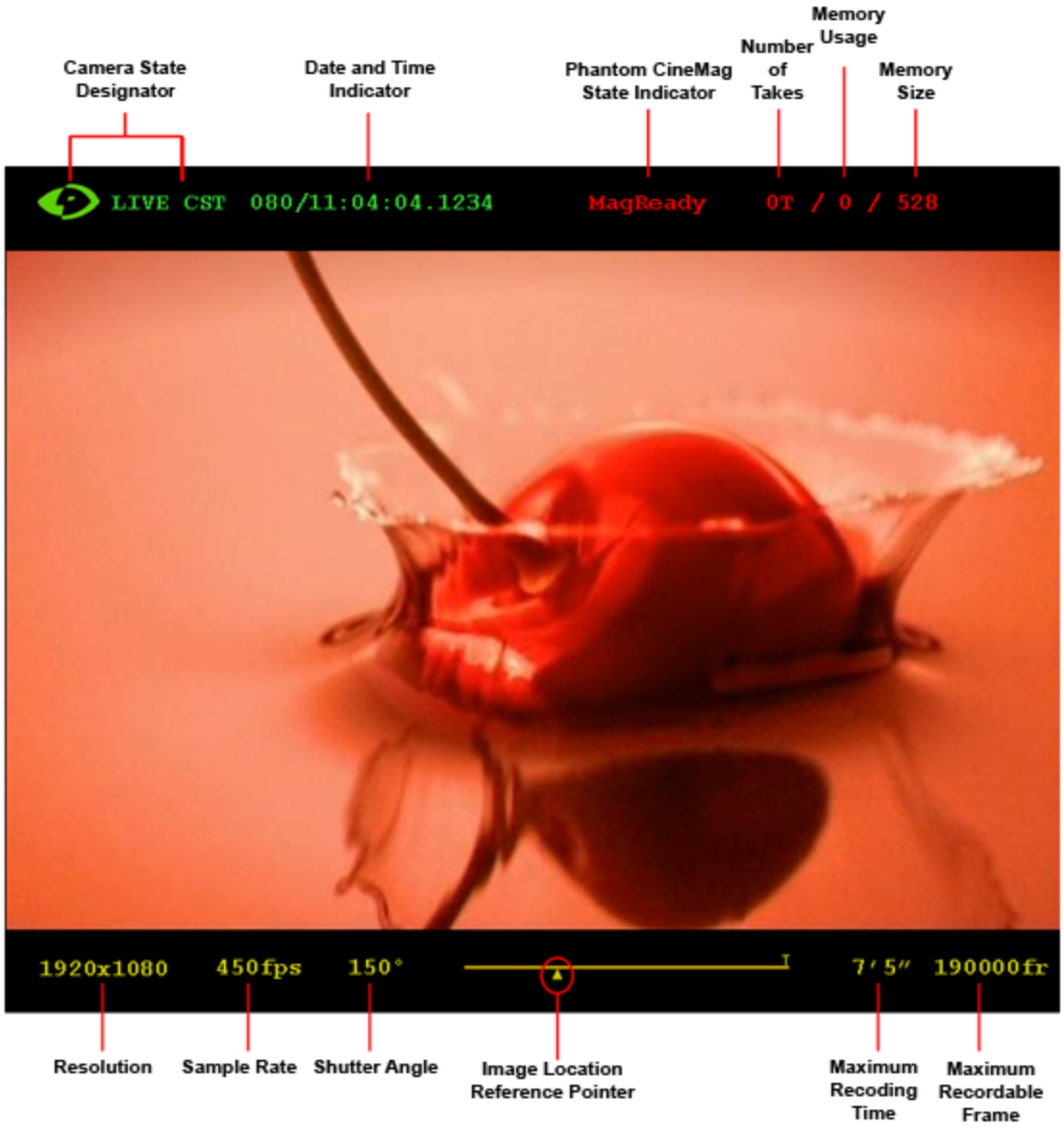

LIVE CST Display - Cine Stored Mode with an attached Phantom CineMag

Below is a brief description of the fields that displayed on the screen:

Camera State Designators

The Phantom logo will be green when the camera is in the LIVE CST mode.

Date and Time

The date and time stamp field indicates; day number/hour:minute:second:microsecond.

Phantom CineMag Status Indicator

The Camera State Designator indicates the operation state of the camera. Various state designators include:

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MagInit - Indicates the Phantom CineMag has been detected either during camera power-up, or when a Phantom CineMag has been inserted onto the camera.

MagScan - Indicates that the Phantom CineMag is running through it power-up, self-diagnostics routines.

MagReady - Indicates that the Phantom CineMag has passed its power-up, self-diagnostics routines.

MagErase - Indicates that the Phantom CineMag has been instructed to erase its contents, and is performing the erasure procedure.

Number of Takes

This field indicates the number of takes or cine files, (movies), recorded to the Phantom CineMag. As takes are recorded the Number of Takes field increments.

Memory Usage

This field indicates the amount of bytes used to store recorded frames. As takes are recorded the Memory Usage field increments.

Memory Size

This field indicates the total number of bytes, or the memory size, of the Phantom CineMag.

Resolution

This field indicates the active pixel area, (Width x Height), of the sensor defined by the user.

Sample Rate

This field specifies the rate the Phantom camera will capture or record image data, (frames), into the camera's memory.

Shutter Angle

This field shows the current, user defined, Shutter Angle or exposure setting of the camera.

Memory Buffer Graphical Representation

The graphical representation of the camera's memory buffer, which acts as a memory gauge will display a Mark In Point, (the vertical line on the far left of the line), and a Mark Out Point, (the vertical line on the far right of the line). The Recording to Memory Location Indicator, (the up-arrow), will be placed just below the Mark In Point. The trigger point, (T), indicates the image, or frame, the trigger signal was sent to and detected by the camera.

Image Location Reference Point

The up-arrow is a graphical representation of the stored memory location of the displayed image within the camera's DRAM or non-volatile Flash location within an attached Phantom CineMag.

Maximum Recording Time

This field indicates the total length of recording time. The recording duration is based on the amount of memory in the camera, along with the resolution and sample rate settings. This field will change based on these variables.

Maximum Recordable Frames

This field indicates how many images or frames will be recorded within the Duration time. This field will also change based on how the amount of memory in the camera, and how the resolution, and sample rate are set and will change accordingly.

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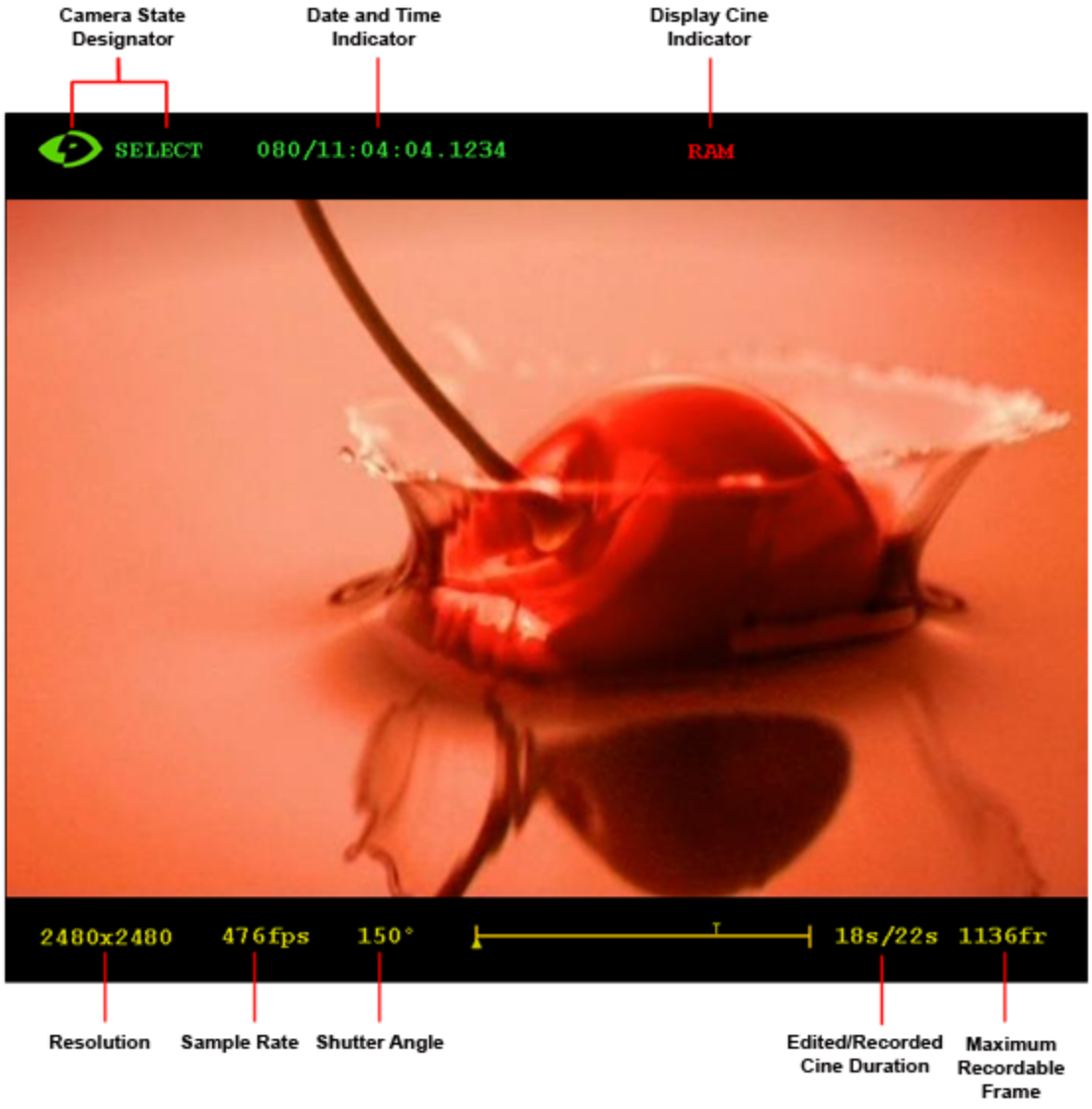
7.2.6 SELECT Display Screen

The "SELECT Display Screen" is used to select which cine to be reviewed, edited, or saved, and the location of the image data (RAM or Phantom CineMag). Cine file stored in a Phantom CineMag will be displayed numerically, while a cine file stored in the camera's DRAM will be displayed with the nomenclature RAM.

THE ON-SCREEN DISPLAY FIELDS



SELECT Mode Display Screen without an attached Phantom CineMag

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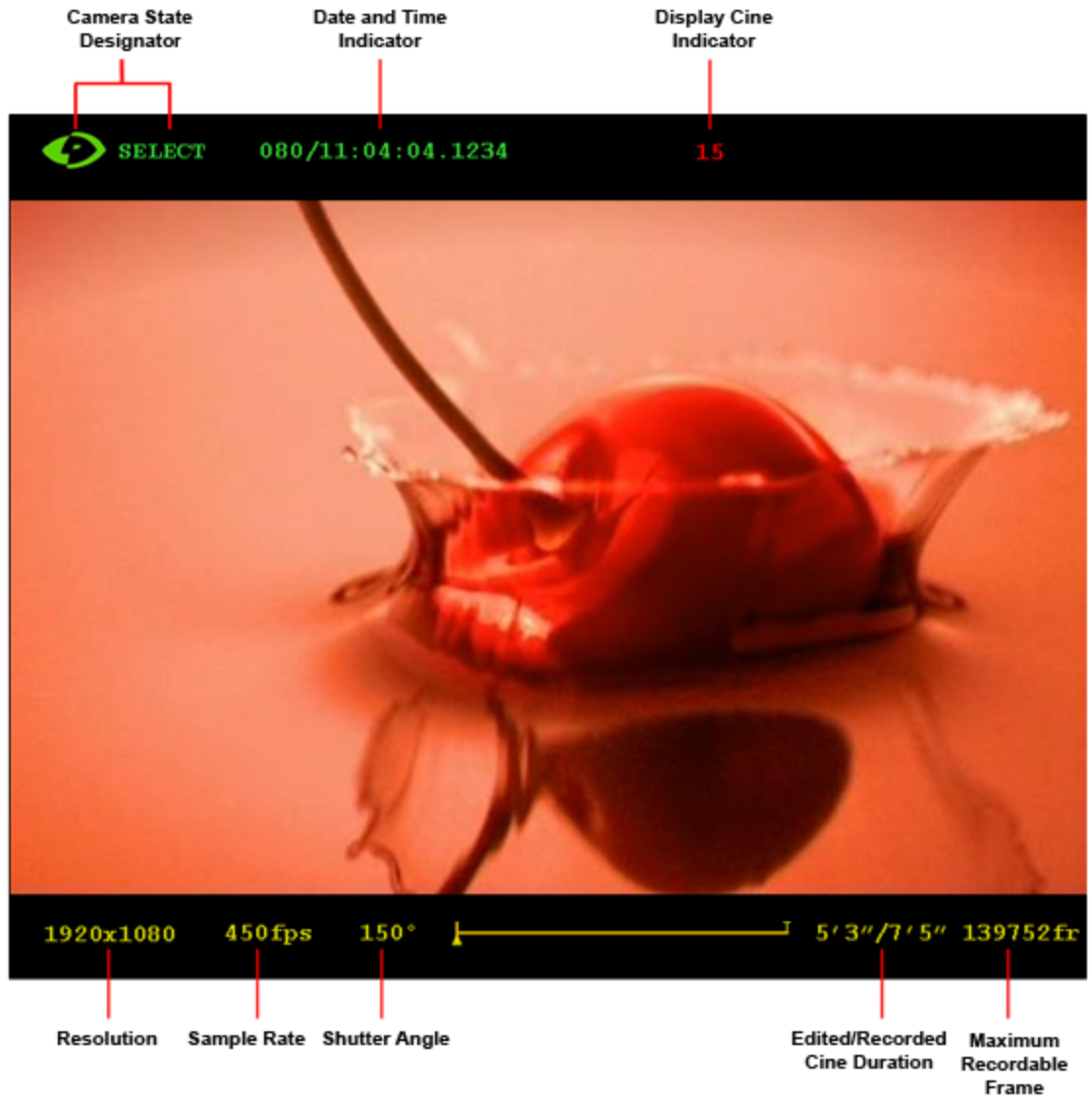

SELECT Mode Display Screen with an attached Phantom CineMag

Below is a brief description of the fields that displayed on the screen:

Camera State Designators

The Phantom logo will be green when the camera is in the SELECT mode.

Date and Time

The date and time stamp field indicates; day number/hour:minute:second:microsecond.

Display Cine Indicator

This field indication where the image data to be reviewed, edited, or saved has been stored. Cine file stored in a Phantom CineMag will be displayed numerically, while a cine file stored in the camera's DRAM will be displayed with the nomenclature RAM.

Resolution

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This field indicates the active pixel area, (Width x Height), of the sensor defined by the user.

Sample Rate

This field specifies the rate the Phantom camera will capture or record image data, (frames), into the camera's memory.

Shutter Angle

This field shows the current, user defined, Shutter Angle or exposure setting of the camera.

Memory Buffer Graphical Representation

The graphical representation of the camera's memory buffer, which acts as a memory gauge will display a Mark In Point, (the vertical line on the far left of the line), and a Mark Out Point, (the vertical line on the far right of the line). The Recording to Memory Location Indicator, (the up-arrow), will be placed just below the Mark In Point. The trigger point, (T), indicates the image, or frame, the trigger signal was sent to and detected by the camera.

Edited/Recorded Cine Duration

In this mode, the Maximum Recording Time field change from a single number to two. The first number represents the duration of the cine contained within the Mark In and Mark Out points. The second number represents the duration or length of the cine file stored in the camera memory buffer.

Maximum Recordable Frames

This field indicates how many images or frames will be recorded within the Duration time. This field will also change based on how the amount of memory in the camera, and how the resolution, and sample rate are set and will change accordingly.

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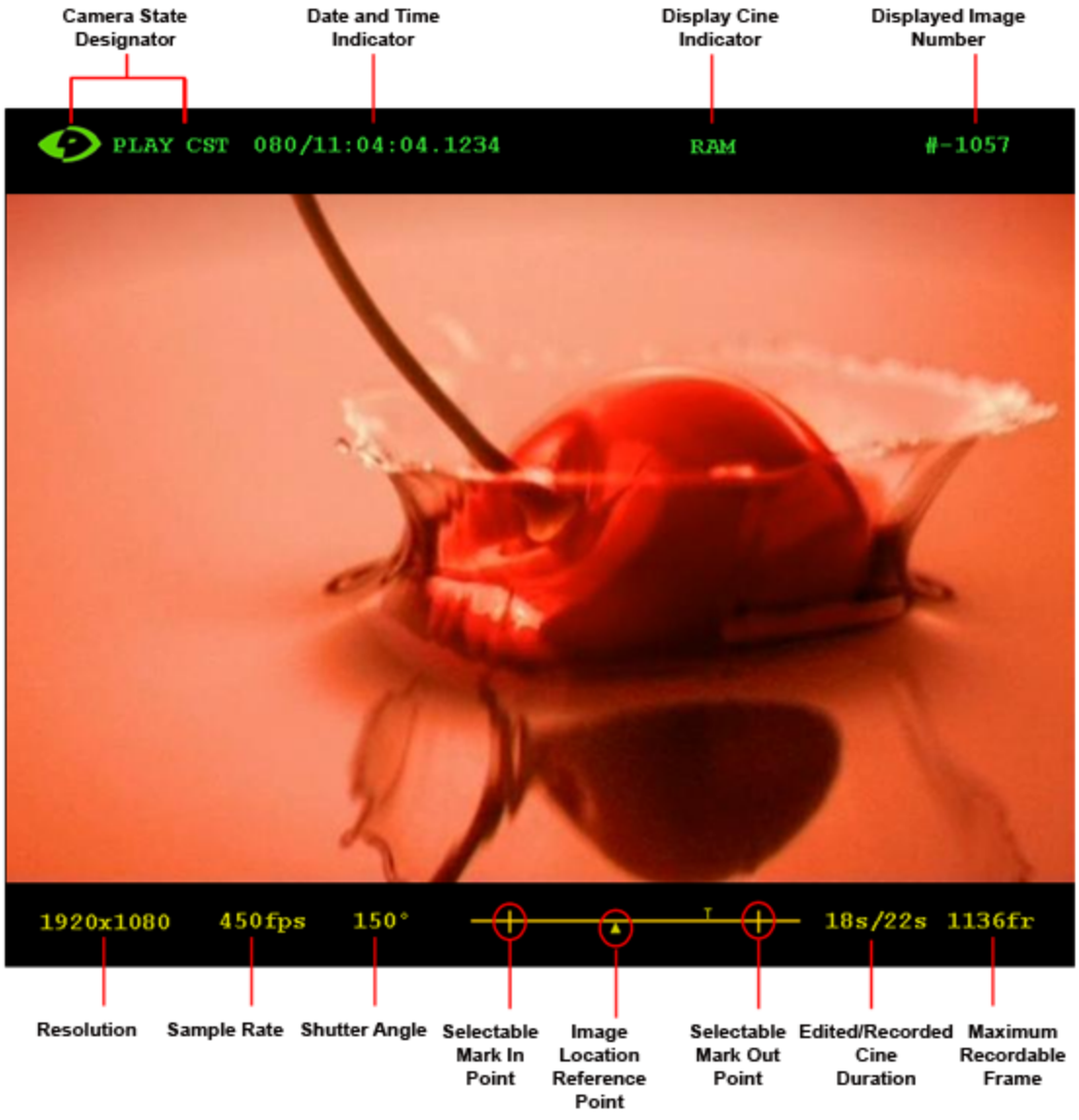
7.2.7 PLAY CST Display Screen

It is from the PLAY CST, (playback, cine stored), mode the user can play back the captured cine file, or set desired Mark In and Mark Out Points to review the capture cine file prior to saving the file to an external storage device. The user can play the cine file forward or in reverse, or pause the playback, using the On-Camera Control buttons.

When running in MultiCine mode, camera can also display PLAY PRE (the preview cine is selected for recording) or PLAY WTn (camera is waiting for trigger for cine partition n), When running in Run/Stop mode (direct recording to cinemag) camera displays PLAY.

THE ON-SCREEN DISPLAY FIELDS



PLAY CST - Playback Cine Stored in Camera DRAM

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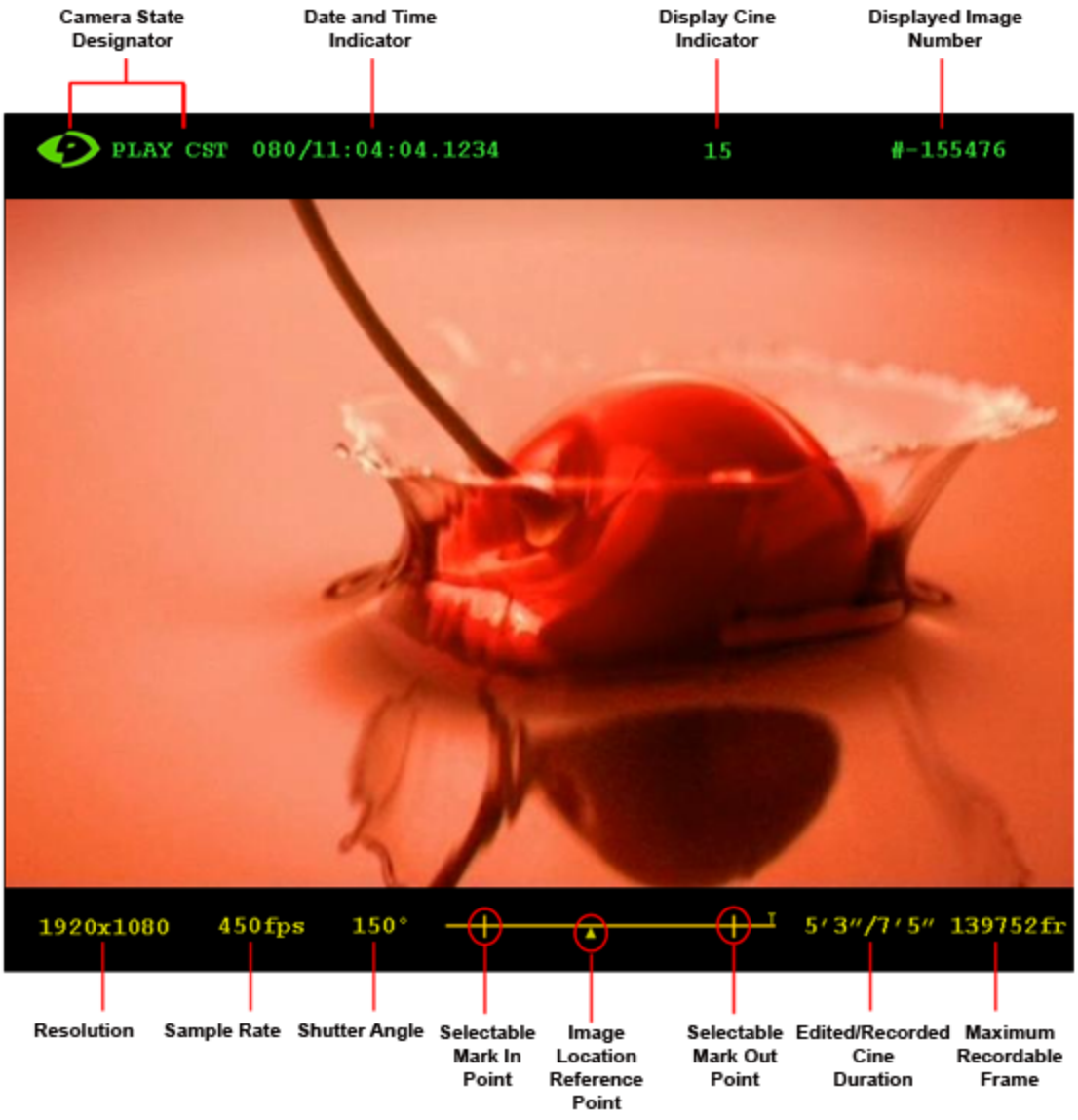

PLAY CST - Playback Cine Stored in Phantom CineMag

Below is a brief description of the fields that displayed on the screen:

Camera State Designators

The Phantom logo will be green when the camera is in the PLAY mode.

Date and Time

The date and time stamp field indicates; day number/hour:minute:second:microsecond.

Display Cine Indicator

This field indication where the image data to be reviewed, edited, or saved has been stored. Cine file stored in a Phantom CineMag will be displayed numerically, while a cine file stored in the camera's DRAM will be displayed with the nomenclature RAM.

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Displayed Image Number

The Displayed Image Number field specifies the number of the image being displayed in the playback window. Zero represents the first image or the trigger point frame. Pre-trigger frames will be represented in negative numbers, while post trigger frames will be positive numbers.

Resolution

This field indicates the active pixel area, (Width x Height), of the sensor defined by the user.

Sample Rate

This field specifies the rate the Phantom camera will capture or record image data, (frames), into the camera's memory.

Shutter Angle

This field shows the current, user defined, Shutter Angle or exposure setting of the camera.

Memory Buffer Graphical Representation

The graphical representation of the cameras' memory buffer, which acts as a memory gauge will display a Mark In Point, (the vertical line on the far left of the line), and a Mark Out Point, (the vertical line on the far right of the line). The Recording to Memory Location Indicator, (the up-arrow), will be placed just below the Mark In Point. The trigger point, (T), indicates the image, or frame, the trigger signal was sent to and detected by the camera.

Selectable Mark In Point

Indicates the user defined Mark In Point defined using the Edit Cine Selector field.

Image Location Reference Point

The up-arrow is a graphical representation of the stored memory location of the displayed image within the camera's DRAM or non-volatile Flash location within an attached Phantom CineMag.

Selectable Mark Out Point

Indicates the user defined Mark Out Point defined using the Edit Cine Selector field.

Edited/Recorded Cine Duration

In this mode, the Maximum Recording Time field change from a single number to two. The first number represents the duration of the cine contained within the Mark In and Mark Out points. The second number represents the duration or length of the cine file stored in the camera memory buffer.

Maximum Recordable Frames

This field indicates how many images or frames will be recorded within the Duration time. This field will also change based on how the amount of memory in the camera, and how the resolution, and sample rate are set and will change accordingly.

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Intentionally Blank

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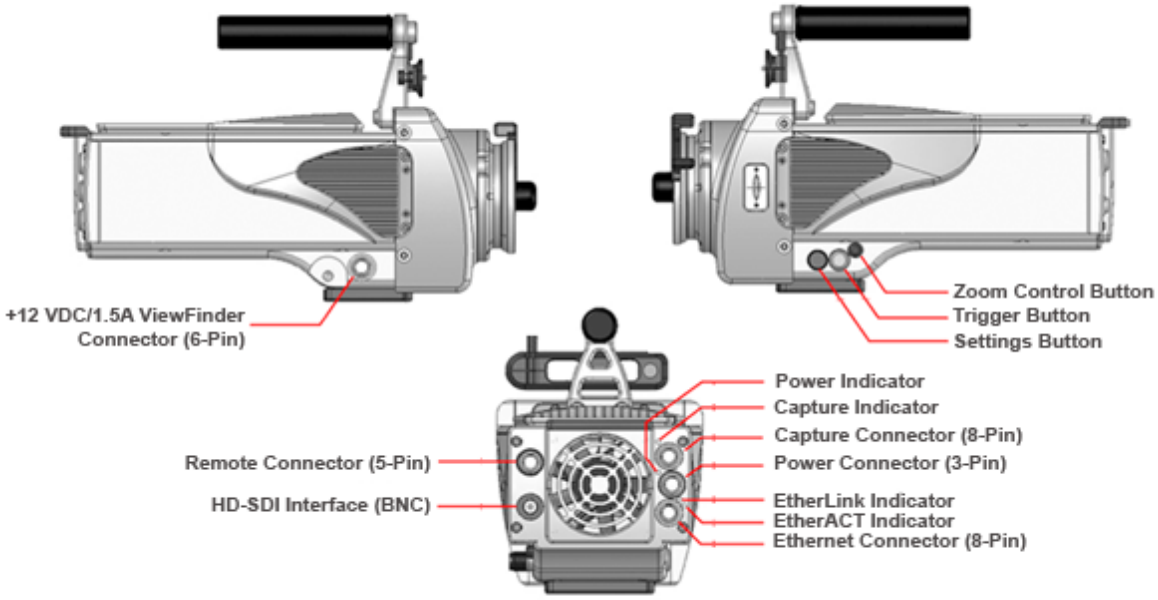
7.3 The "On-Camera" Control Buttons



Both the Phantom 65 and Phantom HD cameras can be controlled via On-Camera Control buttons, including:

Zoom Button

This button is used to toggle through live preview, zoom, and threshold modes, when the camera is in the Preview, Waiting for Pre-Trigger (LIVE PRE) and Preview, Waiting for Trigger (LIVE WTR) or Capture modes.

NOTE

The zoom mode provides a 1:1 pixel view.

When the camera is in the cine recorded, stored in memory, (LIVE CST) state the Zoom button will be used to place the camera into the playback (PLAY CST) mode. When the camera is in the playback, PLAY CST, mode the Zoom button will be used to play and/or stop the playback of the recorded/stored cine files.

Trigger Button

The Trigger button is used to change the camera's operational state when the camera is in either the; Pre-Trigger LIVE PRE (Preview, Waiting for Pre-Trigger), and Capture, LIVE WTR (Preview, Waiting for Trigger), modes. It is also used to provide a soft-trigger to the camera when the camera is in the Capture, LIVE WTR (Preview, Waiting for Trigger) mode.

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When the camera is in the playback, PLAY CST, mode the Trigger button is used to play and/or stop the playback of the recorded/stored cine file in reverse.

When running in Run/Stop Mode the camera will capture frames, (to the Phantom CineMag), after the trigger is pressed once, and stops capturing when the trigger is pressed again.

Select Setup (Settings) Button

This button is used to select the camera,s set up and recording parameters. The camera's parameters can be defined when the camera is in either the Pre-Trigger LIVE PRE (Preview, Waiting for Pre-Trigger), and Capture, LIVE WTR (Preview, Waiting for Trigger), modes.

It also allows you to scroll through the cine file stored in the camera's DRAM image buffer and the Phantom CineMag Flash memory for playback.

The Setup Select button can also be used to scroll through a recorded cine file to find images that you wish to define as Mark-In and Mark-Out points of the file easily.

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7.4 Using the "On-Camera" Control Buttons

The following, are the generic steps to control either the Phantom 65, or Phantom HD camera via the "on-camera" control buttons:

1. Define the Operational Mode of the camera.
2. Toggle through the Preview, Zoom, and Threshold features (optional).
3. Change the Operational State of the camera.
4. Define the Setup and Recording parameters to be used during image capture.
5. Provide a "Soft-Trigger" to the camera.
6. Play/Pause a stored cine file.
7. Edit a stored cine file.
8. Place the camera back into Capture Mode.

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7.4.1 Defining the Operational Mode

There are two methods of defining the Operational Mode of the Phantom 65 or Phantom HD cameras. One way is to use the Phantom Camera Control software, and the other is to use the "on-camera" control button. Below are the steps to perform these methods.

STEP-BY-STEP PROCESSES

Via the Phantom (PCC) Camera Control Application

1. Start the Phantom (PCC) Camera Control Application.
2. Select the Phantom Camera:
   a. Click the Manger Control Panel tab.
   b. Move the cursor over the desired available Phantom camera you wish to connect to, then
   c. Double-click the left mouse key.
3. Select the Operational Mode.
   a. Click on the Live Control Panel tab.
   b. Click on the Advanced Setting selector.
      1) Disable, (uncheck), the 'Auto save to Cine<am/built-in Flash' enable box to operate in Loop Mode.
      2) Enable, (check), the 'Auto save to Cine<am/built-in Flash' enable box to operate in Run/Stop Mode.

Via the Phantom (Legacy) Camera Control Software

1. Start the Phantom (Legacy) Camera Control Software.
2. Open the Acquisition pull-down menu.
3. Select the Setup and Recording... command from the Acquisition menu.
4. Select the Phantom CineMag Operational Mode.
   a. Click on the Flash mem... button in the Setup and Recording dialogue window.
   b. In the Flash memory dialogue window:
      1) Disable, (uncheck), the 'Record to magazine' enable box to operate in Loop Mode.
      2) Enable, (check), the 'Record to magazine, enable box to operate in Run/Stop Mode.
      3) Click the Update button.
      4) Click the OK button.

Via the "On-Camera" Control Buttons

1. From the LIVE PRE (Preview, Waiting for Pre-Trigger), or LIVE display screen:
   a. Press the Select Setup button one time, then
   b. Rotate the button to the Operational Mode field parameter. The field will change from yellow

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to red indicating the field has been selected for changed.

2. Once the Operational Mode field has been selected:

   a. Hold in the Select Setup button, then

   b. Rotate the button to the desired operational mode:

      1) Loop - In the Loop Mode the camera stores the recorded image data into the camera's DRAM buffer. In this mode, the Phantom CineMag operates like any other Flash card, after a cine file is recorded into the camera's DRAM frame buffer, you can manually save it into the CineMag using Phantom Camera Control software.

      2) R/S (Run/Stop) - In Run/Stop Mode the image data is recorded, up to 450fps at HD resolution (2048 x 1080), directly into the Phantom CineMag.

7.4.2 Switching Between the Preview, Zoom, and Threshold Features

The Zoom button is used to toggle through live preview, zoom, and threshold modes, when the camera is in the; LIVE PRE (Preview, Waiting for Pre-Trigger), and LIVE WTR (Preview, Waiting for Trigger), modes.

By default the camera displays a live preview on the attached monitor or viewfinder.

STEP-BY-STEP PROCESS

1. Depressing the Zoom button one time to instruct the camera to zoom in on the subject area with a 1:1 pixel view to help in the focusing process when attached to a monitor or viewfinder otherwise the display skips to the Threshold mode.

2. Depress the Zoom button a second time to place the camera into Threshold mode. This field is used to display the areas of the image that are overexposed.

3. Depress the Zoom button a third time to return the camera to its' default preview mode.

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7.4.3 Changing the Camera's Operational States

The Trigger button is used to change the cameras operational state. By default a camera will start in the LIVE PRE (Preview, Waiting for Pre-Trigger) state.

STEP-BY-STEP PROCESS

1. Depress the Trigger button one time to place the camera into the LIVE WTR (Preview, Waiting for Trigger) or capture/recording mode.

NOTE

If the camera is set to record pre-trigger images the Memory Buffer Graphical Display will show the memory allocation progress, indicating how much of the memory buffer has been filled with image data or frames. It does not, however, display the camera's ability to continuously re-allocate newer images into its scrolling buffer.

If a cine has previously been stored into the camera's DRAM you must hold in the Trigger button for approx. 5-seconds to place the camera in the LIVE WTR state.

7.4.4 Define the Setup and Recording Parameters

STEP-BY-STEP PROCESSES

Select the Parameter to be Configured

1. Depress the Select Setup button one time, then
2. Rotate the button to the desired parameter to be set. The parameter field color will change from yellow to red indicating the selected field to be changed.

NOTE

The above step is required to define all subsequent Setup and Recording parameters.

Define the Operation Mode

1. Hold in the Select Setup button, and rotate the button to the desired parameter:
   a. Loop - In the Loop Mode the camera stores the recorded image data into the camera's DRAM buffer. In this mode, the Phantom CineMag operates like any other Flash card, after a cine file is recorded into the camera's DRAM frame buffer, you can manually save it into the CineMag using Phantom Camera Control software (Cine > Save RAM cine to Flash).
   b. Run/Stop - In Run/Stop Mode the image data is recorded, up to 450fps at HD resolution (2048 x 1080), directly into the Phantom CineMag.

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Define the EI (Exposure Index)

1. To increase the Exposure Index hold in Select Setup button and rotate clockwise.
2. To decrease the Exposure Index hold in and rotate counter clockwise.

Define the GM (Gamma)

1. To increase the Gamma value hold in Select Setup button and rotate clockwise.
2. To decrease the Gamma hold in and rotate counter clockwise.

Define the PD (Pedestal)

1. To increase the Pedestal value hold in Select Setup button and rotate clockwise.
2. To decrease the Pedestal hold in and rotate counter clockwise.

Define the CR - (Chroma)

1. To increase the Chroma value hold in Select Setup button and rotate clockwise.
2. To decrease the Chroma hold in and rotate counter clockwise.

Perform a WB (White Balance) Adjustment

1. To perform a White Balance Adjustment hold in the Select Setup button and rotate the button to the OK setting.
2. Ensure that the area to calculate the White Balance adjustment on is not saturated and is completely over a white reference.
3. Release the Select Setup button.

RESULT: The camera will indicate a display counter next to the WB (White Balance) field indicating that it is performing the White Balance Adjustment.

Perform a BB (Black Balance) Adjustment

1. To perform a Black Balance or Black Reference Adjustment, place the lens cover on the lens.
2. Hold in the Select Setup button and rotate the button to the OK setting.
3. Release the Select button.

RESULT: The camera will indicate replaces the BB (Black Balance) field with a counter indicating that it is performing the Black Balance Adjustment.

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Define the PA (Production Area)

1. To increase the Production Area hold in Select Setup button and rotate clockwise.
2. To decrease the Production Area hold in and rotate counter clockwise.

Specify the Resolution

1. To increase the Resolution hold in Select Setup button and rotate clockwise.
2. To decrease the Resolution hold in and rotate counter clockwise.

RESULT: The image aspect ratio will be displayed with the defined Resolution setting.

Specify the Sample Rate

1. To increase the Sample Rate hold in Select Setup button and rotate clockwise.
2. To decrease the Sample Rate hold in and rotate counter clockwise.

Define the Shutter Angle

1. To increase the Shutter Angle hold in Select Setup button and rotate clockwise.
2. To decrease the Shutter Angle hold in and rotate counter clockwise.

Specify a Post Trigger (via Memory Buffer Graphical Display) Value

1. To decrease the number of Post Trigger frames to be recorded hold in Select Setup button and rotate clockwise.
2. To increase the number of Post Trigger frames to be recorded hold in and rotate counter clockwise.

The following fields will change automatically:

Maximum Recording Time

This field indicates the total length of recording time. The recording duration is based on the amount of memory in the camera, along with the resolution and sample rate settings. This field will change based on these variables.

Maximum Recordable Frames

This field indicates how many images or frames will be recorded within the Duration time. This field will also change based on how the amount of memory in the camera, and how the resolution, and sample rate are set and will change accordingly.

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7.4.5 Providing a "Soft-Trigger"

STEP-BY-STEP PROCESS

1. Depress the Trigger button when the camera is in the LIVE WTR mode to provide a "soft-trigger" to the camera.

NOTE

If the camera was set to capture post trigger frames, (Loop Mode only), the camera will be placed into the LIVE TRG (Recording, Cine Triggered) state. When the camera stops recording the desired number of user defined post trigger frame into the camera's memory, the camera will be placed into the LIVE CST (Cine Stored or ready for playback) state.

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7.4.6 Play/Pause a Stored Cine File

STEP-BY-STEP PROCESSES

Once a cine file has been recorded the camera will be placed into the LIVE CST state.

Place the Camera into the PLAY CST, (Play Cine Stored), Mode

1. Depress the Zoom button one time to place the camera into the PLAY CST (ViewCine) mode.

Select a Cine for Playback

1. Hold the Zoom button in for 1 second to display the cine SELECT screen.
2. Hold in and rotate the Select Setup button until the desired cine is displayed.
3. Release the Select button.

Play/Pause the Stored Cine Forward

1. Depress the Zoom button a one time to instruct the camera to forward through the memory buffer or play the images stored in the memory buffer one image at a time until the end of the recording as been reach or the user pauses the playback process.
2. Depress the button a second time to pause the playback process.

Play/Pause the Stored Cine Backward

1. Depress the Trigger button one time to instruct the camera to play the image in reverse, continuously one image at a time.
2. Depress the button a second time to pause the process.

Step Through The Stored Cine File

1. Rotate the Select Setup button clockwise to step forward through the recorded images one image at a time.
2. Rotate the button counter-clockwise to step backwards through the recorded images one image at a time.

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7.4.7 Edit a Stored Cine File

NOTE

To mark the beginning and end of a recorded cine file, the camera must be in the PLAY CST, (playback cine stored), mode.

STEP-BY-STEP PROCESSES

Setting the Mark In Point

1. Rotate the Select Setup button to the Memory Buffer Graphical Representation field.
2. Hold in and rotate the Select Setup button until the desired starting image is displayed on the monitor or in the viewfinder, then
3. Release the Select Setup button.
4. Rotate the Setup Select button to the Edit field.
5. Hold in the Select Setup button, then
6. Rotate it until the MARK IN option is displayed on the monitor or viewfinder, and
7. Release.

NOTE

The graphical representation of the memory buffer will now display a vertical line marking the starting point for the cine file to be played back.

Setting the Mark Out Point

1. Rotate the Select Setup button to the Memory Buffer Graphical Representation field.
2. Hold in and rotate the Select Setup button until the desired starting image is displayed on the monitor or in the viewfinder, then
3. Release the Select Setup button.
4. Rotate the Setup Select button to the Edit field.
5. Hold in the Select Setup button, then
6. Rotate it until the MARK OUT option is displayed on the monitor or viewfinder, and
7. Release.

NOTE

The memory buffer graphical representation will now display a vertical line marking the end point of the cine file to be played back.

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7.4.8 Placing the Camera Back Into the Capture Mode

STEP-BY-STEP PROCESS

1. To return to the LIVE WTR, (Preview, Waiting for Trigger), mode hold in the Trigger button in for 5 seconds.

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Part VIII

8 Phantom Cine Control Panel - Help

The Phantom Cine Control Panel utility can be used to simultaneously play multiple cine files opened via the New View button in the Phantom Camera Control, ViewCine dialogue window. It allows the end user to view multiple saved cine files that were captured from multiple cameras, networked together, recording the same event from different camera angles.

Updated: 3/18/2010

8.1 Using the Phantom Cine Control Panel

STEP-BY-STEP PROCESS

To use the Phantom Cine Control Panel:

1. Start the Phantom Camera Control application.
2. Click on the File pull-down menu, and
   a. Select the Open>Cine... command.
      1) Navigate to the cine file you wish to review.
      2) Highlight the file to be opened, and
      3) Click the Open button.
3. Open the second cine file to be reviewed by clicking on the New View button in the ViewCine dialogue window.

NOTE

A second instance of the ViewCine window is opened.

   a. Click on the Open button located within the Cine Source field, and
      1) Navigate to the second cine file to be opened.
      2) Highlight the cine, and
      3) Click the Open button.
4. Continue opening multiple instances of the ViewCine dialogue window, and opening the cine files to be reviewed until all the desired cine file have been opened.

NOTE

The playback speed of the cine file is dependent on the number of cine files opened and the processor of the control unit.

5. Once all the cine files are opened, resize and arrange the ViewCine dialogue windows so all the cine files can be viewed simultaneously.

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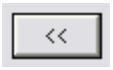
6. Start the Phantom Cine Control Panel application.

   a. Use the Playback buttons, described below, to review the cine files.



Play Fast Reverse decrements images: the total number of cine frames /1000, no less than 10 frames, auto adjusting to cine size.

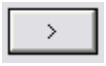
Play Fast Forward increments images: the total number of cine frames /1000, no less than 10 frames, auto adjusting to cine size.

Standard Play Reverse decrements 1 image at a time.

Standard Play Forward increments 1 image at a time.

Pause Playback stops or pauses the playback process.

Play Single Frame Reverse rewinds 1 image only.



Play Single Frame Forward advances forward 1 image only.

NOTE

When finished reviewing the cine files, close all unnecessary instances of the Phantom Camera Control application.

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Part

9 Functional Descriptions

The purpose of this module is to specify the functionality of various features and options associated with a Phantom camera, and all related the Phantom Camera Control applications.

9.1 Black Reference/Current Session Reference Adjustments

After a camera comes up to its operating temperature, or after changing camera settings, calibrating the camera to a black reference will help ensure you get the best possible images from your Phantom camera.

A black reference measures the value of each pixel with no light on it (black) and stores the values in a calibration file (called an “STG”). Later, the camera firmware can use those values to ensure that all sensor pixels are providing the same value for equivalent amounts of light.

There are two types of black references on Phantom cameras, they are a:

Current Session Reference (CSR)

Current Session Reference” is a calibration procedure similar to Black Reference except the fact that it computes the pixel offsets only on the part of the sensor that is the next greater value after the resolution set in acquisition parameters.

This way, the offsets can be computed for any frame rate, exposure or resolution, giving a more precise compensation of the pixel errors, dependent on the acquiring parameters and on temperature. Of course, if the acquisition parameters change, you may get worse results than using the universal Black Reference procedure. The CSR is applied correctly only for the set of acquisition parameters used when this reference was calculated.

This black reference is available for any image resolution. When the acquisition parameters, (resolution, frame rate, exposure time), have certain values, (for example, the frame rate is high or the set of values forces the camera performances), it is recommended to do a CSR for that specific set of parameters in order to obtain a better image.

After executing a CSR, if you change the acquisition parameters, the calibration calculated during the Current Session Reference will apply partially correct on the new setup. For example, if you use a bigger resolution than the one used when the CSR was calculated, the CSR adjustments will be applied only on that part of image and for the rest of the image the black reference calibration calculated in the Options window will be used.

The CSR calibration can be saved in a .STG file, for example: 1009_res256x256_rate80_exp12000_edr0..STG.

Thus, you can easily choose a .STG according to the acquisition you are currently using. This .STG file will be opened automatically at the program restart if you rename it by the serial number of the camera: 1009.STG in this example.

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Black Reference (BR).

Performing a Black Reference ensures the best possible images are being captured and recorded by the camera's sensor.

	AREA EFFECTED	USE WHEN	SAVES TO
Black Reference (BR)	Entire sensor.	Shooting at full resolution and after adjusting frame rate or exposure. Any time the operating temperature of the camera changes more than a few degrees.	Default STG file on the computer and/or in the camera non-volatile memory.
Current Session Reference (CSR)	The part of the sensor that is the next greater value after the resolution set in acquisition parameters.	When shooting at less than full resolution and after adjusting resolution, frame rate or exposure.	Separate, re-loadable, STG file and/or the camera non-volatile memory.

NOTE

Before performing either a Black Reference or Current Session Reference Adjustment ensure that the EDR, Extreme Dynamic Range), Exposure setting is set to zero, and the Auto Exposure and Image-Based Auto-Trigger features are disabled.

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9.2 Frame Rate Tables

NOTE

- ***Each value has to be truncated to an integer when selected in the Live Control Panel.***
- ***Each camera works on a reduced interval of frame rates ,(e.g., the v7 is from 100 to 160,000fps).***
- ***The tables shown are for the Ethernet cameras based on 4MHz internal clock.***

Following are two tables of possible frame rates, (in frames per second), for the Phantom camera family:

Lock to IRIG Mode Table

100.00	200.00	400.00	500.00	800.00
1000.00	1600.00	2000.00	2500.00	3200.00
4000.00	5000.00	6400.00	8000.00	10000.00
12500.00	16000.00	20000.00	25000.00	32000.00
40000.00	50000.00	62500.00	80000.00	100000.00
125000.00	160000.00	200000.00	250000.00	400000.00
500000.00	800000.00	1000000.00	2000000.00	4000000.00

Sync to Internal Clock Mode Table

Below are the possible frame rates, (in frame per second), for the Phantom V-Series camera family when clocked via the camera's internal oscillator:

1.00	2.00	3.00	4.00	5.00	6.00
7.00	8.00	9.00	10.00	11.00	12.00
13.00	14.00	15.00	16.00	17.00	18.00
19.00	20.00	21.00	22.00	23.00	24.00
25.00	26.00	27.00	28.00	29.00	30.00
31.00	32.00	33.00	34.00	35.00	36.00
37.00	38.00	39.00	40.00	41.00	42.00
43.00	44.00	45.00	46.00	47.00	48.00
49.00	50.00	51.00	52.00	53.00	54.00
55.00	56.00	57.00	58.00	59.00	60.00
61.00	62.00	63.00	64.00	65.00	66.00
67.00	68.00	69.00	70.00	71.00	72.00
73.00	74.00	75.00	76.00	77.00	78.00
79.00	80.00	81.00	82.00	63.00	84.00
85.00	86.00	87.00	88.00	89.00	90.00
91.00	92.00	93.00	94.00	95.00	96.00
97.00	98.00	99.00	100.00	101.00	102.00
103.00	104.00	105.00	106.00	107.00	108.00
109.00	110.00	111.00	112.00	113.00	114.00
115.00	116.00	117.00	118.00	119.00	120.00
121.00	122.00	123.00	124.00	125.00	126.00
127.00	128.00	129.00	130.00	131.00	132.00
133.00	134.00	135.00	136.00	137.00	138.00
139.00	140.00	141.00	142.00	143.00	144.00
145.00	146.00	147.00	148.00	149.00	150.00
151.00	152.00	153.00	154.00	155.00	156.00
157.00	158.00	159.00	160.00	161.00	162.00

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163.01	164.00	165.00	166.00	167.00	168.00
169.00	170.00	171.01	172.01	173.00	174.00
175.00	176.00	177.01	178.01	179.00	180.00
181.00	182.00	183.01	184.00	185.01	186.00
187.00	188.01	189.00	190.01	191.00	192.00
193.00	194.01	195.01	196.00	197.01	198.00
199.00	200.00	201.01	202.01	203.00	204.01
205.00	206.01	207.01	208.01	209.01	210.01
211.00	212.01	213.00	214.01	215.01	216.01
217.00	218.01	219.01	220.01	221.01	222.00
223.00	224.00	225.01	226.00	227.00	228.01
229.00	230.00	231.00	232.01	233.01	234.00
235.00	236.00	237.01	238.01	239.01	240.01
241.01	242.01	243.01	244.01	245.01	246.00
247.00	248.00	249.00	250.00	251.00	252.00
253.00	254.00	255.00	256.00	257.00	258.01
259.00	260.01	261.01	262.00	263.00	264.01
265.01	266.01	267.00	268.01	269.02	270.01
271.00	272.02	273.00	274.01	275.01	276.01
277.01	278.01	279.02	280.01	281.02	282.01
283.01	284.01	285.00	286.00	287.01	288.02
289.02	290.00	291.01	292.01	293.02	294.01
295.01	296.01	297.00	298.02	299.02	300.01
301.00	302.00	303.01	304.02	305.02	306.02
307.01	308.00	309.02	310.00	311.02	312.01
313.01	314.02	315.01	316.01	317.01	318.02
319.00	320.00	321.00	322.01	323.02	324.02
325.02	326.02	327.01	328.00	329.00	330.01
331.02	332.01	333.00	334.00	335.01	336.02
337.01	338.01	339.01	340.02	341.01	342.03
343.02	344.03	345.01	346.02	347.01	348.01
349.01	350.02	351.00	352.02	353.01	354.01
355.02	356.03	357.02	358.01	359.00	360.00
361.01	362.02	363.01	364.00	365.03	366.03
367.01	368.02	369.00	370.03	371.02	372.02
373.03	374.01	375.02	376.01	377.00	378.00
379.00	380.01	381.02	382.01	363.03	384.02
385.02	386.03	387.03	388.01	389.03	390.02
391.01	392.00	393.00	394.01	395.02	396.00
397.02	398.01	399.00	400.00	401.00	402.01
403.02	404.04	405.02	406.01	407.00	408.04
409.04	410.00	411.02	412.03	413.01	414.04
415.02	416.02	417.01	418.02	419.02	420.04
421.01	422.03	423.01	424.04	425.03	426.03
427.03	428.04	429.00	430.02	431.03	432.01
433.04	434.03	435.02	436.01	437.02	438.02
439.03	440.04	441.01	442.04	443.02	444.00
445.04	446.03	447.03	448.03	449.03	450.05
451.01	452.03	453.00	454.03	455.01	456.05
457.04	458.03	459.03	460.03	461.04	462.00
463.02	464.04	465.01	466.04	467.02	468.00
469.04	470.04	471.03	472.03	473.04	474.05
475.00	476.02	477.04	478.01	479.04	480.02
481.00	482.04	483.03	484.03	485.02	486.03
487.03	488.04	489.06	490.02	491.04	492.00
493.04	494.01	495.05	496.03	497.02	498.01
499.00	500.00	501.00	502.01	503.02	504.03

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505.05	506.01	507.04	508.00	509.04	510.01
511.05	512.03	513.02	514.01	515.07	516.06
517.06	518.00	519.01	520.02	521.04	522.06
523.01	524.04	525.00	526.04	527.01	528.05
529.03	530.01	531.07	532.06	533.05	534.05
535.05	536.05	537.06	538.07	539.01	540.03
541.05	542.01	543.04	544.07	545.03	546.00
547.05	548.02	549.07	550.06	551.04	552.03
553.02	554.02	555.02	556.02	557.03	558.04
559.05	560.07	561.01	562.03	563.06	564.02
565.05	566.01	567.05	568.02	569.07	570.04
571.02	572.00	573.07	574.05	575.04	576.04
577.03	578.03	579.04	580.05	581.06	582.07
583.01	584.03	585.05	586.08	587.03	588.06
589.01	590.06	591.02	592.07	593.03	594.00
595.06	596.04	597.01	598.09	599.07	600.06
601.05	602.05	603.05	604.05	605.05	606.06
607.07	608.09	609.01	610.04	611.06	612.09
613.03	614.06	615.01	616.05	617.09	618.05
619.00	620.06	621.02	622.08	623.05	624.02
625.00	626.08	627.06	628.04	629.03	630.02
631.01	632.01	633.01	634.01	635.02	636.03
637.04	638.06	639.08	640.00	641.03	642.05
643.09	644.02	645.06	646.10	647.04	648.09
649.03	650.09	651.04	652.10	653.06	654.02
655.09	656.06	657.03	658.00	659.09	660.07
661.05	662.03	663.02	664.01	665.00	666.00
667.00	668.00	669.01	670.02	671.03	672.04
673.06	674.08	675.11	676.02	677.05	678.08
679.00	680.04	681.08	682.01	683.06	684.11
685.05	686.11	687.05	688.11	689.06	690.01
691.09	692.04	693.00	694.08	695.05	696.02
697.11	698.08	699.06	700.04	701.02	702.00
703.11	704.10	705.09	706.09	707.09	708.09
709.09	710.10	711.11	712.12	713.01	714.03
715.05	716.08	717.10	718.00	719.04	720.07
721.11	722.02	723.07	724.11	725.03	726.08
727.01	728.07	729.13	730.06	731.13	732.06
733.00	734.08	735.02	736.11	737.06	738.01
739.10	740.06	741.02	742.12	743.08	744.05
745.02	746.13	747.10	748.08	749.06	750.05
751.03	752.02	753.01	754.01	755.00	756.00
757.00	758.01	759.01	760.02	761.04	762.05
763.07	764.09	765.11	766.14	767.02	768.05
769.08	770.12	771.01	772.05	773.10	774.14
775.04	776.10	777.00	778.06	779.12	780.03
781.10	782.01	783.09	784.01	785.08	786.01
787.09	788.02	789.11	790.05	791.14	792.08
793.02	794.12	795.07	796.02	797.13	798.08
799.04	800.00	801.12	802.09	803.05	804.02
805.15	806.13	807.10	808.08	809.06	810.04
811.03	812.02	813.01	814.00	815.16	816.16
817.16	818.16	819.00	820.01	821.02	822.03
823.05	824.06	825.08	826.10	827.13	828.16
829.02	830.05	831.08	832.12	833.16	834.03
835.07	836.12	837.17	838.05	839.10	840.16
841.04	842.11	843.17	844.06	845.13	846.02

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847.10	848.18	849.08	850.16	851.06	852.15
853.06	854.15	855.07	856.16	857.08	858.00
859.11	860.03	861.14	862.07	863.19	864.12
865.05	866.18	867.11	868.06	869.19	870.13
871.08	872.03	873.17	874.13	875.08	876.04
877.00	878.16	879.12	880.09	881.06	882.03
883.00	884.17	885.15	886.13	887.11	888.10
889.09	890.08	891.07	892.06	893.06	894.05
895.05	896.06	897.06	898.07	899.08	900.09
901.10	902.12	903.14	904.16	905.18	906.00
907.03	908.06	909.09	910.13	911.16	912.20
913.03	914.08	915.12	916.17	917.01	918.06
919.12	920.17	921.02	922.08	923.15	924.00
925.07	926.14	927.21	928.07	929.15	930.02
931.10	932.18	933.05	934.14	935.02	936.11
937.21	938.09	939.19	940.07	941.18	942.06
943.17	944.06	945.18	946.07	947.19	948.09
949.22	950.12	951.02	952.15	953.06	954.20
955.11	956.02	957.17	958.08	959.00	960.15
961.08	962.00	963.16	964.09	965.02	966.18
967.12	968.05	969.23	970.17	971.11	972.05
973.24	974.18	975.13	976.09	977.04	978.23
979.19	980.15	981.11	982.08	983.04	984.01
985.22	986.19	987.17	988.14	989.12	990.10
991.08	992.06	993.05	994.04	995.02	996.02
997.01	998.00	999.00	1000.00	1001.00	1002.00
1003.01	1004.02	1005.03	1006.04	1007.05	1008.06
1009.08	1010.10	1011.12	1012.15	1013.17	1014.20
1015.23	1016.00	1017.04	1018.07	1019.11	1020.15
1021.19	1022.23	1023.02	1024.07	1025.12	1026.17
1027.22	1028.01	1029.07	1030.13	1031.19	1032.26
1033.06	1034.13	1035.20	1036.00	1037.08	1038.15
1039.23	1040.04	1041.12	1042.21	1043.02	1044.11
1045.21	1046.03	1047.12	1048.22	1049.04	1050.14
1051.25	1052.08	1053.19	1054.02	1055.13	1056.25
1057.08	1058.20	1059.04	1060.16	1061.01	1062.13
1063.26	1064.11	1065.25	1066.10	1067.24	1068.09
1069.23	1070.09	1071.24	1072.10	1073.25	1074.11
1075.27	1076.14	1077.01	1078.17	1079.04	1080.21
1081.08	1082.25	1083.13	1084.01	1085.19	1086.07
1087.25	1088.14	1089.03	1090.22	1091.11	1092.00
1093.19	1094.09	1095.29	1096.19	1097.09	1098.30
1099.20	1100.11	1101.02	1102.23	1103.14	1104.06
1105.28	1106.19	1107.11	1108.03	1109.26	1110.19
1111.11	1112.04	1113.28	1114.21	1115.14	1116.07
1117.01	1118.26	1119.19	1120.13	1121.08	1122.02
1123.28	1124.23	1125.18	1126.13	1127.08	1128.03
1129.31	1130.26	1131.22	1132.18	1133.14	1134.11
1135.07	1136.04	1137.01	1138.30	1139.28	1140.25
1141.23	1142.20	1143.18	1144.16	1145.15	1146.13
1147.12	1148.11	1149.10	1150.09	1151.08	1152.07
1153.07	1154.07	1155.07	1156.07	1157.07	1158.08
1159.08	1160.09	1161.10	1162.12	1163.13	1164.14
1165.16	1166.18	1167.20	1168.22	1169.25	1170.28
1171.30	1172.33	1173.02	1174.05	1175.09	1176.12
1177.16	1178.20	1179.25	1180.29	1181.33	1182.03
1183.08	1184.13	1185.19	1186.24	1187.30	1188.00

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1189.06	1190.12	1191.19	1192.25	1193.32	1194.03
1195.10	1196.17	1197.25	1198.32	1199.04	1200.12
1201.20	1202.28	1203.01	1204.09	1205.18	1206.27
1207.00	1208.09	1209.19	1210.29	1211.02	1212.12
1213.22	1214.33	1215.07	1216.18	1217.29	1218.03
1219.14	1220.26	1221.00	1222.12	1223.24	1224.36
1225.11	1226.24	1227.37	1228.12	1229.26	1230.01
1231.15	1232.29	1233.05	1234.19	1235.33	1236.09
1237.24	1238.01	1239.16	1240.31	1241.08	1242.24
1243.01	1244.17	1245.33	1246.11	1247.27	1248.05
1249.22	1250.00	1251.17	1252.35	1253.13	1254.31
1255.10	1256.28	1257.07	1258.26	1259.05	1260.24
1261.03	1262.23	1263.02	1264.22	1265.02	1266.22
1267.03	1268.23	1269.04	1270.24	1271.05	1272.26
1273.07	1274.29	1275.10	1276.32	1277.14	1278.36
1279.18	1280.00	1281.23	1282.05	1283.29	1284.11
1285.35	1286.17	1287.00	1288.24	1289.08	1290.32
1291.16	1292.41	1293.24	1294.08	1295.34	1296.18
1297.02	1298.28	1299.12	1300.39	1301.24	1302.08
1303.36	1304.21	1305.06	1306.34	1307.19	1308.04
1309.33	1310.19	1311.05	1312.34	1313.20	1314.06
1315.36	1316.22	1317.09	1318.39	1319.26	1320.13
1321.00	1322.31	1323.19	1324.06	1325.38	1326.26
1327.14	1328.02	1329.35	1330.23	1331.11	1332.00
1333.33	1334.22	1335.11	1336.01	1337.35	1338.24
1339.14	1340.03	1341.38	1342.28	1343.18	1344.09
1345.44	1346.35	1347.25	1348.16	1349.07	1350.44
1351.35	1352.27	1353.18	1354.10	1355.01	1356.39
1357.31	1358.23	1359.16	1360.08	1361.01	1362.40
1363.33	1364.26	1365.19	1366.12	1367.05	1368.46
1369.39	1370.33	1371.27	1372.21	1373.15	1374.10
1375.04	1376.46	1377.41	1378.36	1379.31	1380.26
1381.22	1382.17	1383.13	1384.08	1385.04	1386.00
1387.44	1388.41	1389.37	1390.34	1391.30	1392.27
1393.24	1394.21	1395.19	1396.16	1397.14	1398.11
1399.09	1400.07	1401.05	1402.03	1403.02	1404.00
1405.48	1406.47	1407.46	1408.45	1409.44	1410.44
1411.43	1412.43	1413.43	1414.43	1415.43	1416.43
1417.43	1418.44	1419.45	1420.45	1421.46	1422.48
1423.49	1424.50	1425.01	1426.02	1427.04	1428.06
1429.08	1430.10	1431.13	1432.15	1433.18	1434.21
1435.24	1436.27	1437.30	1438.33	1439.37	1440.40
1441.44	1442.48	1443.00	1444.04	1445.09	1446.13
1447.18	1448.23	1449.28	1450.33	1451.38	1452.43
1453.49	1454.02	1455.07	1456.13	1457.19	1458.26
1459.32	1460.39	1461.45	1462.52	1463.06	1464.13
1465.20	1466.28	1467.35	1468.43	1469.51	1470.05
1471.13	1472.21	1473.30	1474.38	1475.47	1476.01
1477.10	1478.20	1479.29	1480.38	1481.48	1482.03
1483.13	1484.23	1485.33	1486.44	1487.54	1488.10
1489.20	1490.31	1491.42	1492.54	1493.09	1494.21
1495.33	1496.45	1497.01	1498.13	1499.25	1500.38
1501.50	1502.07	1503.19	1504.32	1505.46	1506.02
1507.16	1508.30	1509.43	1510.00	1511.14	1512.29
1513.43	1514.00	1515.15	1516.30	1517.45	1518.03
1519.18	1520.33	1521.49	1522.07	1523.23	1524.39
1525.55	1526.14	1527.30	1528.47	1529.05	1530.22

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1531.39	1532.57	1533.15	1534.33	1535.51	1536.10
1537.28	1538.46	1539.05	1540.24	1541.43	1542.02
1543.21	1544.40	1545.60	1546.19	1547.39	1548.59
1549.19	1550.39	1551.59	1552.19	1553.40	1554.00
1555.21	1556.42	1557.03	1558.24	1559.45	1560.06
1561.28	1562.50	1563.11	1564.33	1565.56	1566.17
1567.40	1568.01	1569.24	1570.48	1571.09	1572.33
1573.56	1574.18	1575.42	1576.04	1577.29	1578.53
1579.16	1580.40	1581.03	1582.28	1583.53	1584.16
1585.41	1586.04	1587.30	1588.56	1589.19	1590.46
1591.09	1592.36	1593.63	1594.26	1595.53	1596.17
1597.44	1598.08	1599.36	1600.00	1601.28	1602.56
1603.21	1604.49	1605.14	1606.43	1607.07	1608.36
1609.01	1610.31	1611.60	1612.25	1613.55	1614.21
1615.51	1616.16	1617.47	1618.12	1619.43	1620.09
1621.40	1622.06	1623.38	1624.04	1625.36	1626.02
1627.34	1628.00	1629.33	1630.66	1631.32	1632.65
1633.32	1634.65	1635.32	1636.66	1637.33	1638.00
1639.34	1640.02	1641.36	1642.04	1643.39	1644.06
1645.41	1646.09	1647.45	1648.13	1649.48	1650.17
1651.53	1652.21	1653.58	1654.26	1655.63	1656.31
1657.00	1658.37	1659.06	1660.44	1661.13	1662.51
1663.20	1664.59	1665.28	1666.67	1667.36	1668.06
1669.45	1670.15	1671.54	1672.24	1673.64	1674.34
1675.04	1676.45	1677.15	1678.56	1679.26	1680.67
1681.38	1682.09	1683.50	1684.21	1685.63	1686.34
1687.05	1688.48	1689.19	1690.62	1691.33	1692.05
1693.48	1694.20	1695.63	1696.35	1697.07	1698.51
1699.24	1700.68	1701.40	1702.13	1703.58	1704.30
1705.03	1706.48	1707.21	1708.67	1709.40	1710.13
1711.60	1712.33	1713.06	1714.53	1715.27	1716.00
1717.48	1718.21	1719.69	1720.43	1721.17	1722.65
1723.40	1724.14	1725.63	1726.37	1727.12	1728.61
1729.36	1730.10	1731.60	1732.35	1733.10	1734.61
1735.36	1736.11	1737.62	1738.37	1739.13	1740.64
1741.40	1742.16	1743.68	1744.44	1745.20	1746.72
1747.49	1748.25	1749.02	1750.55	1751.31	1752.08
1753.62	1754.39	1755.16	1756.70	1757.47	1758.24
1759.01	1760.56	1761.34	1762.11	1763.67	1764.45
1765.23	1766.00	1767.57	1768.35	1769.13	1770.69
1771.48	1772.26	1773.05	1774.62	1775.41	1776.20
1777.78	1778.57	1779.36	1780.15	1781.74	1782.53
1783.33	1784.12	1785.71	1786.51	1787.31	1788.11
1789.71	1790.51	1791.31	1792.11	1793.72	1794.53
1795.33	1796.14	1797.75	1798.56	1799.37	1800.18
1801.80	1802.61	1803.43	1804.24	1805.05	1806.68
1807.50	1808.32	1809.14	1810.77	1811.59	1812.42
1813.24	1814.06	1815.71	1816.53	1817.36	1818.18
1819.01	1820.66	1821.49	1822.32	1823.15	1824.82
1825.65	1826.48	1827.32	1828.15	1829.83	1830.66
1831.50	1832.34	1833.18	1834.02	1835.70	1836.55
1837.39	1838.24	1839.08	1840.77	1841.62	1842.47
1843.32	1844.17	1845.02	1846.72	1847.58	1848.43
1849.28	1850.14	1851.85	1852.71	1853.57	1854.43
1855.29	1856.15	1857.01	1858.74	1859.60	1860.47
1861.33	1862.20	1863.06	1864.80	1865.67	1866.54
1867.41	1868.29	1869.16	1870.03	1871.78	1872.66

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1873.54	1874.41	1875.29	1876.17	1877.05	1878.82
1879.70	1880.58	1881.47	1882.35	1883.24	1884.13
1885.01	1886.79	1887.68	1888.57	1889.47	1890.36
1891.25	1892.15	1893.04	1894.84	1895.73	1896.63
1897.53	1898.43	1899.34	1900.24	1901.14	1902.04
1903.86	1904.76	1905.67	1906.58	1907.49	1908.40
1909.31	1910.22	1911.13	1912.05	1913.88	1914.79
1915.71	1916.63	1917.55	1918.47	1919.39	1920.31
1921.23	1922.15	1923.08	1924.00	1925.85	1926.78
1927.71	1928.64	1929.57	1930.50	1931.43	1932.37
1933.30	1934.24	1935.17	1936.11	1937.05	1938.92
1939.86	1940.81	1941.75	1942.69	1943.63	1944.58
1945.53	1946.47	1947.42	1948.37	1949.32	1950.27
1951.22	1952.17	1953.13	1954.08	1955.03	1956.95
1957.91	1958.86	1959.82	1960.78	1961.75	1962.71
1963.67	1964.64	1965.60	1966.57	1967.54	1968.50
1969.47	1970.44	1971.41	1972.39	1973.36	1974.33
1975.31	1976.28	1977.26	1978.24	1979.22	1980.20
1981.18	1982.16	1983.14	1984.13	1985.11	1986.10
1987.08	1988.07	1989.06	1990.05	1991.04	1992.03
1993.02	1994.02	1995.01	1996.01	1997.00	1998.00
1999.00	2000.00	2001.00	2002.00	2003.00	2004.01
2005.01	2006.02	2007.02	2008.03	2009.04	2010.05
2011.06	2012.07	2013.09	2014.10	2015.11	2016.13
2017.15	2018.16	2019.18	2020.20	2021.22	2022.24
2023.27	2024.29	2025.32	2026.34	2027.37	2028.40
2029.43	2030.46	2031.49	2032.52	2033.55	2034.59
2035.62	2036.66	2037.70	2038.74	2039.78	2040.82
2041.86	2042.90	2043.94	2044.99	2046.04	2047.08
2048.13	2049.18	2050.23	2051.28	2052.33	2053.39
2054.44	2055.50	2056.56	2057.61	2058.67	2059.73
2060.79	2061.86	2062.92	2063.98	2065.05	2066.12
2067.18	2068.25	2069.32	2070.39	2071.47	2072.54
2073.61	2074.69	2075.77	2076.84	2077.92	2079.00
2080.08	2081.17	2082.25	2083.33	2084.42	2085.51
2086.59	2087.68	2088.77	2089.86	2090.96	2092.05
2093.14	2094.24	2095.34	2096.44	2097.54	2098.64
2099.74	2100.84	2101.94	2103.05	2104.16	2105.26
2106.37	2107.48	2108.59	2109.70	2110.82	2111.93
2113.05	2114.16	2115.28	2116.40	2117.52	2118.64
2119.77	2120.89	2122.02	2123.14	2124.27	2125.40
2126.53	2127.66	2128.79	2129.93	2131.06	2132.20
2133.33	2134.47	2135.61	2136.75	2137.89	2139.04
2140.18	2141.33	2142.47	2143.62	2144.77	2145.92
2147.07	2148.23	2149.38	2150.54	2151.69	2152.85
2154.01	2155.17	2156.33	2157.50	2158.66	2159.83
2160.99	2162.16	2163.33	2164.50	2165.67	2166.85
2168.02	2169.20	2170.37	2171.55	2172.73	2173.91
2175.10	2176.28	2177.46	2178.65	2179.84	2181.03
2182.21	2183.41	2184.60	2185.79	2186.99	2188.18
2189.38	2190.58	2191.78	2192.98	2194.19	2195.39
2196.60	2197.80	2199.01	2200.22	2201.43	2202.64
2203.86	2205.07	2206.29	2207.51	2208.72	2209.94
2211.17	2212.39	2213.61	2214.84	2216.07	2217.29
2218.52	2219.76	2220.99	2222.22	2223.46	2224.69
2225.93	2227.17	2228.41	2229.65	2230.90	2232.14
2233.39	2234.64	2235.89	2237.14	2238.39	2239.64

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2240.90	2242.15	2243.41	2244.67	2245.93	2247.19
2248.45	2249.72	2250.98	2252.25	2253.52	2254.79
2256.06	2257.34	2258.61	2259.89	2261.16	2262.44
2263.72	2265.01	2266.29	2267.57	2268.86	2270.15
2271.44	2272.73	2274.02	2275.31	2276.61	2277.90
2279.20	2280.50	2281.80	2283.11	2284.41	2285.71
2287.02	2288.33	2289.64	2290.95	2292.26	2293.58
2294.89	2296.21	2297.53	2298.85	2300.17	2301.50
2302.82	2304.15	2305.48	2306.81	2308.14	2309.47
2310.80	2312.14	2313.48	2314.81	2316.16	2317.50
2318.84	2320.19	2321.53	2322.88	2324.23	2325.58
2326.93	2328.29	2329.64	2331.00	2332.36	2333.72
2335.08	2336.45	2337.81	2339.18	2340.55	2341.92
2343.29	2344.67	2346.04	2347.42	2348.80	2350.18
2351.56	2352.94	2354.33	2355.71	2357.10	2358.49
2359.88	2361.28	2362.67	2364.07	2365.46	2366.86
2368.27	2369.67	2371.07	2372.48	2373.89	2375.30
2376.71	2378.12	2379.54	2380.95	2382.37	2383.79
2385.21	2386.63	2388.06	2389.49	2390.91	2392.34
2393.78	2395.21	2396.64	2398.08	2399.52	2400.96
2402.40	2403.85	2405.29	2406.74	2408.19	2409.64
2411.09	2412.55	2414.00	2415.46	2416.92	2418.38
2419.84	2421.31	2422.77	2424.24	2425.71	2427.18
2428.66	2430.13	2431.61	2433.09	2434.57	2436.05
2437.54	2439.02	2440.51	2442.00	2443.49	2444.99
2446.48	2447.98	2449.48	2450.98	2452.48	2453.99
2455.49	2457.00	2458.51	2460.02	2461.54	2463.05
2464.57	2466.09	2467.61	2469.14	2470.66	2472.19
2473.72	2475.25	2476.78	2478.31	2479.85	2481.39
2482.93	2484.47	2486.02	2487.56	2489.11	2490.66
2492.21	2493.77	2495.32	2496.88	2498.44	2500.00
2501.56	2503.13	2504.70	2506.27	2507.84	2509.41
2510.99	2512.56	2514.14	2515.72	2517.31	2518.89
2520.48	2522.07	2523.66	2525.25	2526.85	2528.45
2530.04	2531.65	2533.25	2534.85	2536.46	2538.07
2539.68	2541.30	2542.91	2544.53	2546.15	2547.77
2549.39	2551.02	2552.65	2554.28	2555.91	2557.54
2559.18	2560.82	2562.46	2564.10	2565.75	2567.39
2569.04	2570.69	2572.35	2574.00	2575.66	2577.32
2578.98	2580.65	2582.31	2583.98	2585.65	2587.32
2589.00	2590.67	2592.35	2594.03	2595.72	2597.40
2599.09	2600.78	2602.47	2604.17	2605.86	2607.56
2609.26	2610.97	2612.67	2614.38	2616.09	2617.80
2619.52	2621.23	2622.95	2624.67	2626.40	2628.12
2629.85	2631.58	2633.31	2635.05	2636.78	2638.52
2640.26	2642.01	2643.75	2645.50	2647.25	2649.01
2650.76	2652.52	2654.28	2656.04	2657.81	2659.57
2661.34	2663.12	2664.89	2666.67	2668.45	2670.23
2672.01	2673.80	2675.59	2677.38	2679.17	2680.97
2682.76	2684.56	2686.37	2688.17	2689.98	2691.79
2693.60	2695.42	2697.24	2699.06	2700.88	2702.70
2704.53	2706.36	2708.19	2710.03	2711.86	2713.70
2715.55	2717.39	2719.24	2721.09	2722.94	2724.80
2726.65	2728.51	2730.38	2732.24	2734.11	2735.98
2737.85	2739.73	2741.60	2743.48	2745.37	2747.25
2749.14	2751.03	2752.92	2754.82	2756.72	2758.62
2760.52	2762.43	2764.34	2766.25	2768.17	2770.08

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2772.00	2773.93	2775.85	2777.78	2779.71	2781.64
2783.58	2785.52	2787.46	2789.40	2791.35	2793.30
2795.25	2797.20	2799.16	2801.12	2803.08	2805.05
2807.02	2808.99	2810.96	2812.94	2814.92	2816.90
2818.89	2820.87	2822.87	2824.86	2826.86	2828.85
2830.86	2832.86	2834.87	2836.88	2838.89	2840.91
2842.93	2844.95	2846.98	2849.00	2851.03	2853.07
2855.10	2857.14	2859.19	2861.23	2863.28	2865.33
2867.38	2869.44	2871.50	2873.56	2875.63	2877.70
2879.77	2881.84	2883.92	2886.00	2888.09	2890.17
2892.26	2894.36	2896.45	2898.55	2900.65	2902.76
2904.87	2906.98	2909.09	2911.21	2913.33	2915.45
2917.58	2919.71	2921.84	2923.98	2926.12	2928.26
2930.40	2932.55	2934.70	2936.86	2939.02	2941.18
2943.34	2945.51	2947.68	2949.85	2952.03	2954.21
2956.39	2958.58	2960.77	2962.96	2965.16	2967.36
2969.56	2971.77	2973.98	2976.19	2978.41	2980.63
2982.85	2985.07	2987.30	2989.54	2991.77	2994.01
2996.25	2998.50	3000.75	3003.00	3005.26	3007.52
3009.78	3012.05	3014.32	3016.59	301887	3021.15
3023.43	3025.72	3028.01	3030.30	3032.60	3034.90
3037.21	3039.51	3041.83	3044.14	3046.46	3048.78
3051.11	3053.44	3055.77	3058.10	3060.44	3062.79
3065.13	3067.48	3069.84	3072.20	3074.56	3076.92
3079.29	3081.66	3084.04	3086.42	3088.80	3091.19
3093.58	3095.98	3098.37	3100.78	3103.18	3105.59
3108.00	3110.42	3112.84	3115.26	3117.69	3120.12
3122.56	3125.00	3127.44	3129.89	3132.34	3134.80
3137.25	3139.72	3142.18	3144.65	3147.13	3149.61
3152.09	3154.57	3157.06	3159.56	3162.06	3164.56
3167.06	3169.57	3172.09	3174.60	3177.12	3179.65
3182.18	3184.71	3187.25	3189.79	3192.34	3194.89
3197.44	3200.00	3202.56	3205.13	3207.70	3210.27
3212.85	3215.43	3218.02	3220.61	3223.21	3225.81
3228.41	3231.02	3233.63	3236.25	3238.87	3241.49
3244.12	3246.75	3249.39	3252.03	3254.68	3257.33
3259.98	3262.64	3265.31	3267.97	3270.65	3273.32
3276.00	3278.69	3281.38	3284.07	3286.77	3289.47
3292.18	3294.89	3297.61	3300.33	3303.06	3305.79
3308.52	3311.26	3314.00	3316.75	3319.50	3322.26
3325.02	3327.79	3330.56	3333.33	3336.11	3338.90
3341.69	3344.48	3347.28	3350.08	3352.89	3355.70
3358.52	3361.34	3364.17	3367.00	3369.84	3372.68
3375.53	3378.38	3381.23	3384.09	3386.96	3389.83
3392.71	3395.59	3398.47	3401.36	3404.26	3407.16
3410.06	3412.97	3415.88	3418.80	3421.73	3424.66
3427.59	3430.53	3433.48	3436.43	3439.38	3442.34
3445.31	3448.28	3451.25	3454.23	3457.22	3460.21
3463.20	3466.20	3469.21	3472.22]	3475.24	3478.26
3481.29	3484.32	3487.36	3490.40	3493.45	3496.50
3499.56	3502.63	3505.70	3508.77	3511.85	3514.94
3518.03	3521.13	3524.23	3527.34	3530.45	3533.57
3536.69	3539.82	3542.96	3546.10	3549.25	3552.40
3555.56	3558.72	3561.89	3565.06	3568.24	3571.43
3574.62	3577.82	3581.02	3584.23	3587.44	3590.66
3593.89	3597.12	3600.36	3603.60	3606.85	3610.11
3613.37	3616.64	3619.91	3623.19	3626.47	3629.76

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3633.06	3636.36	3639.67	3642.99	3646.31	3649.64
3652.97	3656.31	3659.65	3663.00	3666.36	3669.72
3673.09	3676.47	3679.85	3683.24	3686.64	3690.04
3693.44	3696.86	3700.28	3703.70	3707.14	3710.58
3714.02	3717.47	3720.93	3724.39	3727.87	3731.34
3734.83	3738.32	3741.81	3745.32	3748.83	3752.35
3755.87	3759.40	3762.94	3766.48	3770.03	3773.58
3777.15	3780.72	3784.30	3787.88	3791.47	3795.07
3798.67	3802.28	3805.90	3809.52	3813.16	3816.79
3820.44	3824.09	3827.75	3831.42	3835.09	3838.77
3842.46	3846.15	3849.86	3853.56	3857.28	3861.00
3864.73	3868.47	3872.22	3875.97	3879.73	3883.50
3887.27	3891.05	3894.84	3898.64	3902.44	3906.25
3910.07	3913.89	3917.73	3921.57	3925.42	3929.27
3933.14	3937.01	3940.89	3944.77	3948.67	3952.57
3956.48	3960.40	3964.32	3968.25	3972.19	3976.14
3980.10	3984.06	3988.04	3992.02	3996.00	4000.00
4004.00	4008.02	4012.04	4016.06	4020.10	4024.14
4028.20	4032.26	4036.33	4040.40	4044.49	4048.58
4052.68	4056.80	4060.91	4065.04	4069.18	4073.32
4077.47	4081.63	4085.80	4089.98	4094.17	4098.36
4102.56	4106.78	4111.00	4115.23	4119.46	4123.71
4127.97	4132.23	4136.50	4140.79	4145.08	4149.38
4153.69	4158.00	4162.33	4166.67	4171.01	4175.37
4179.73	4184.10	4188.48	4192.87	4197.27	4201.68
4206.10	4210.53	4214.96	4219.41	4223.86	4228.33
4232.80	4237.29	4241.78	4246.28	4250.80	4255.32
4259.85	4264.39	4268.94	4273.50	4278.07	4282.66
4287.25	4291.85	4296.46	4301.08	4305.71	4310.34
4314.99	4319.65	4324.32	4329.00	4333.69	4338.39
4343.11	4347.83	4352.56	4357.30	4362.05	4366.81
4371.58	4376.37	4381.16	4385.96	4390.78	4395.60
4400.44	4405.29	4410.14	4415.01	4419.89	4424.78
4429.68	4434.59	4439.51	4444.44	4449.39	4454.34
4459.31	4464.29	4469.27	4474.27	4479.28	4484.30
4489.34	4494.38	4499.44	4504.50	4509.58	4514.67
4519.77	4524.89	4530.01	4535.15	4540.30	4545.45
4550.63	4555.81	4561.00	4566.21	4571.43	4576.66
4581.90	4587.16	4592.42	4597.70	4602.99	4608.29
4613.61	4618.94	4624.28	4629.63	4634.99	4640.37
4645.76	4651.16	4656.58	4662.00	4667.44	4672.90
4678.36	4683.84	4689.33	4694.84	4700.35	4705.88
4711.43	4716.98	4722.55	4728.13	4733.73	4739.34
4744.96	4750.59	4756.24	4761.90	4767.58	4773.27
4778.97	4784.69	4790.42	4796.16	4801.92	4807.69
4813.48	4819.28	4825.09	4830.92	4836.76	4842.62
4848.48	4854.37	4860.27	4866.18	4872.11	4878.05
4884.00	4889.98	4895.96	4901.96	4907.98	4914.00
4920.05	4926.11	4932.18	4938.27	4944.38	4950.50
4956.63	4962.78	4968.94	4975.12	4981.32	4987.53
4993.76	5000.00	5006.26	5012.53	5018.82	5025.13
5031.45	5037.78	5044.14	5050.51	5056.89	5063.29
5069.71	5076.14	5082.59	5089.06	5095.54	5102.04
5108.56	5115.09	5121.64	5128.21	5134.79	5141.39
5148.01	5154.64	5161.29	5167.96	5174.64	5181.35
5188.07	5194.81	5201.56	5208.33	5215.12	5221.93
5228.76	5235.60	5242.46	5249.34	5256.24	5263.16

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5270.09	5277.04	5284.02	5291.01	5298.01	5305.04
5312.08	5319.15	5326.23	5333.33	5340.45	5347.59
5354.75	5361.93	5369.13	5376.34	5383.58	5390.84
5398.11	5405.41	5412.72	5420.05	5427.41	5434.78
5442.18	5449.59	5457.03	5464.48	5471.96	5479.45
5486.97	5494.51	5502.06	5509.64	5517.24	5524.86
5532.50	5540.17	5547.85	5555.56	5563.28	5571.03
5578.80	5586.59	5594.41	5602.24	5610.10	5617.98
5625.88	5633.80	5641.75	5649.72	5657.71	5665.72
5673.76	5681.82	5689.90	5698.01	5706.13	5714.29
5722.46	5730.66	5738.88	5747.13	5755.40	5763.69
5772.01	5780.35	5788.71	5797.10	5805.52	5813.95
5822.42	5830.90	5839.42	5847.95	5856.52	5865.10
5873.72	5882.35	5891.02	5899.71	5908.42	5917.16
5925.93	5934.72	5943.54	5952.38	5961.25	5970.15
5979.07	5988.02	5997.00	6006.01	6015.04	6024.10
6033.18	6042.30	6051.44	6060.61	6069.80	6079.03
6088.28	6097.56	6106.87	6116.21	6125.57	6134.97
6144.39	6153.85	6163.33	6172.84	6182.38	6191.95
6201.55	6211.18	6220.84	6230.53	6240.25	6250.00
6259.78	6269.59	6279.43	6289.31	6299.21	6309.15
6319.12	6329.11	6339.14	6349.21	6359.30	6369.43
6379.59	6389.78	6400.00	6410.26	6420.55	6430.87
6441.22	6451.61	6462.04	6472.49	6482.98	6493.51
6504.07	6514.66	6525.29	6535.95	6546.64	6557.38
6568.14	6578.95	6589.79	6600.66	6611.57	6622.52
6633.50	6644.52	6655.57	6666.67	6677.80	6688.96
6700.17	6711.41	6722.69	6734.01	6745.36	6756.76
6768.19	6779.66	6791.17	6802.72	6814.31	6825.94
6837.61	6849.32	6861.06	6872.85	6884.68	6896.55
6908.46	6920.42	6932.41	6944.44	6956.52	6968.64
6980.80	6993.01	7005.25	7017.54	7029.88	7042.25
7054.67	7067.14	7079.65	7092.20	7104.80	7117.44
7130.12	7142.86	7155.64	7168.46	7181.33	7194.24
7207.21	7220.22	7233.27	7246.38	7259.53	7272.73
7285.97	7299.27	7312.61	7326.01	7339.45	7352.94
7366.48	7380.07	7393.72	7407.41	7421.15	7434.94
7448.79	7462.69	7476.64	7490.64	7504.69	7518.80
7532.96	7547.17	7561.44	7575.76	7590.13	7604.56
7619.05	7633.59	7648.18	7662.84	7677.54	7692.31
7707.13	7722.01	7736.94	7751.94	7766.99	7782.10
7797.27	7812.50	7827.79	7843.14	7858.55	7874.02
7889.55	7905.14	7920.79	7936.51	7952.29	7968.13
7984.03	8000.00	8016.03	8032.13	8048.29	8064.52
8080.81	8097.17	8113.59	8130.08	8146.64	8163.27
8179.96	8196.72	8213.55	8230.45	8247.42	8264.46
8281.57	8298.76	8316.01	8333.33	8350.73	8368.20
8385.74	8403.36	8421.05	8438.82	8456.66	8474.58
8492.57	8510.64	8528.78	8547.01	8565.31	8583.69
8602.15	8620.69	8639.31	8658.01	8676.79	8695.65
8714.60	8733.62	8752.74	8771.93	8791.21	8810.57
8830.02	8849.56	8869.18	8888.89	8908.69	8928.57
8948.55	8968.61	8988.76	9009.01	9029.35	9049.77
9070.29	9090.91	9111.62	9132.42	9153.32	9174.31
9195.40	9216.59	9237.88	9259.26	9280.74	9302.33
9324.01	9345.79	9367.68	9389.67	9411.76	9433.96
9456.26	9478.67	9501.19	9523.81	9546.54	9569.38

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9592.33	9615.38	9638.55	9661.84	9685.23	9708.74
9732.36	9756.10	9779.95	9803.92	9828.01	9852.22
9876.54	9900.99	9925.56	9950.25	9975.06	10000.00
10025.06	10050.25	10075.57	10101.01	10126.58	10152.28
10178.12	10204.08	10230.18	10256.41	10282.78	10309.28
10335.92	10362.69	10389.61	10416.67	10443.86	10471.20
10498.69	10526.32	10554.09	10582.01	10610.08	10638.30
10666.67	10695.19	10723.86	10752.69	10781.67	10810.81
10840.11	10869.57	10899.18	10928.96	10958.90	10989.01
11019.28	11049.72	11080.33	11111.11	11142.06	11173.18
11204.48	11235.96	11267.61	11299.44	11331.44	11363.64
11396.01	11428.57	11461.32	11494.25	11527.38	11560.69
11594.20	11627.91	11661.81	11695.91	11730.21	11764.71
11799.41	11834.32	11869.44	11904.76	11940.30	11976.05
12012.01	12048.19	12084.59	12121.21	12158.05	12195.12
12232.42	12269.94	12307.69	12345.68	12383.90	12422.36
12461.06	12500.00	12539.18	12578.62	12618.30	12658.23
12698.41	12738.85	12779.55	12820.51	12861.74	1903.23
12944.98	12987.01	13029.32	13071.90	13114.75	13157.89
13201.32	13245.03	13289.04	13333.33	13377.93	13422.82
13468.01	13513.51	13559.32	13605.44	13651.88	13698.63
13745.70	13793.10	13840.83	13888.89	13937.28	13986.01
14035.09	14084.51	14134.28	14184.40	14234.88	14285.71
14336.92	14388.49	14440.43	14492.75	14545.45	14598.54
14652.01	14705.88	14760.15	14814.81	14869.89	14925.37
14981.27	15037.59	15094.34	15151.52	15209.13	15267.18
15325.67	15384.62	15444.02	15503.88	15564.20	15625.00
15686.27	15748.03	15810.28	15873.02	15936.25	16000.00
16064.26	16129.03	16194.33	16260.16	16326.53	16393.44
16460.91	16528.93	16597.51	16666.67	16736.40	16806.72
16877.64	16949.15	17021.28	17094.02	17167.38	17241.38
17316.02	17391.30	17467.25	17543.86	17621.15	17699.12
17777.78	17857.14	17937.22	18018.02	18099.55	18181.82
18264.84	18348.62	18433.18	18518.52	18604.65	18691.59
18779.34	18867.92	18957.35	19047.62	19138.76	19230.77
19323.67	19417.48	19512.20	19607.84	19704.43	19801.98
19900.50	20000.00	20100.50	20202.02	20304.57	20408.16
20512.82	20618.56	20725.39	20833.33	20942.41	21052.63
21164.02	21276.60	21390.37	21505.38	21621.62	21739.13
21857.92	21978.02	22099.45	22222.22	22346.37	22471.91
22598.87	22727.27	22857.14	22988.51	23121.39	23255.81
23391.81	23529.41	23668.64	23809.52	23952.10	24096.39
24242.42	24390.24	24539.88	24691.36	24844.72	25000.00
25157.23	25316.46	25477.71	25641.03	25806.45	25974.03
26143.79	26315.79	26490.07	26666.67	26845.64	27027.03
27210.88	27397.26	27586.21	27777.78	27972.03	28169.01
28368.79	28571.43	28776.98	28985.51	29197.08	29411.76
29629.63	29850.75	30075.19	30303.03	30534.35	30769.23
31007.75	31250.00	31496.06	31746.03	32000.00	32258.06
32520.33	32786.89	33057.85	33333.33	33613.45	33898.31
34188.03	34482.76	34782.61	35087.72	35398.23	35714.29
36036.04	36363.64	36697.25	37037.04	37383.18	37735.85
38095.24	38461.54	38834.95	39215.69	39603.96	40000.00
40404.04	40816.33	41237.11	41666.67	42105.26	42553.19
43010.75	43478.26	43956.04	44444.44	44943.82	45454.55
45977.01	46511.63	47058.82	47619.05	48192.77	48780.49
49382.72	50000.00	50632.91	51282.05	51948.05	52631.58

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Intentionally Blank

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53333.33	54054.05	54794.52	55555.56	56338.03	57142.86
57971.01	58823.53	59701.49	60606.06	61538.46	62500.00
63492.06	64516.13	65573.77	66666.67	67796.61	68965.52
70175.44	71428.57	72727.27	74074.07	75471.70	76923.08
78431.37	80000.00	81632.65	83333.33	85106.38	86956.52
88888.89	90909.09	93023.26	95238.10	97560.98	100000.00
102564.10	105263.16	108108.11	111111.11	114285.71	117647.06
121212.12	125000.00	129032.26	133333.33	137931.03	142857.14
148148.15	153846.15	160000.00	166666.67	173913.04	181818.18
190476.19	200000.00	210526.32	222222.22	235294.12	250000.00
266666.67	285714.29	307692.31	333333.33	363636.36	400000.00
444444.44	500000.00	571428.57	666666.67	800000.00	1000000.00
1333333.33	2000000.00	4000000.00			

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9.3 Image-Based Auto-Trigger

The Image-Based Auto-Trigger feature allows selected Phantom camera models, (Miro eX 2 (optional), Miro eX 4, and soon the “newer” v-Series cameras, to trigger themselves when the image changes in a selectable region of the frame. For the v-Series implementation, there will also be a mode which allows this feature to generate a hardware trigger signal for multi-camera installations.

A few user definable parameters allow the auto-trigger behavior to be adjusted to operating conditions, filtering out unintended triggers due to vibration, changes in illumination, slow-moving shadows, etc.

The Auto-Trigger operation begins by the user selecting a rectangular area within the image, similar to the region used for auto-exposure, the Auto-Trigger region.

As each frame is captured, the image in the Auto-Trigger region is compared to an earlier copy of the same region that has been stored in a dedicated memory. After the comparison is made, the image in memory is updated to the current image, to be used in the future.

The result of the comparison determines if a trigger is generated. A pixel being compared is considered “active" if its level has changed, (brightened or darkened), by more than a preset threshold. The number of active pixels for a given frame is counted, and if it exceeds a set number, a trigger is generated. The required number of active pixels is specified as a percentage of the area of the Auto-Trigger region.

When an Auto-Trigger condition is detected, the Auto-Trigger signal of the camera is pulled low. The Auto-Trigger signal is available on Pin-N of the Capture connector.

IMAGE-BASED AUTO-TRIGGER OPERATING MODES

Several operating modes are possible for the Image-Based Auto-Trigger system:

MODE	FUNCTIONAL DESCRIPTION
Mode 0	Image-Based Auto-Trigger is disabled.
Mode 1	Camera will drive both the auto-trigger and trigger itself when an auto-trigger is detected. If the auto-trigger signal is pulled low by an external device, the camera will be triggered.
Mode 2	The image changes are analyzed, and when an auto-trigger condition has been detected, the auto-trigger signal will be pulled low, as in Mode 1. However, the camera will not trigger itself. An external device pulling the auto-trigger signal low will not trigger the camera either. Mode 2 is useful when external control of the auto-trigger is desired, for instance, it is required that the auto-trigger feature is disabled for some known transient event. The auto-trigger signal from the camera will be routed through some external device and back into the trigger input of the camera.

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MULTI-CAMERA IMAGE-BASED AUTO-TRIGGER

When multiple cameras are used to capture an event, it is usually desirable to trigger all cameras simultaneously. This can be achieved in two basic ways:

OPTION	DESCRIPTION	SETUP
Option 1	All the cameras will be triggered when either of the cameras detects an auto-trigger event.	1. Set all cameras to Mode 1. 2. Connect the auto-trigger signal of all cameras together.
Option 2	Only when the primary camera detects an auto-trigger event it will trigger itself and simultaneously trigger all the secondary cameras.	1. Set Primary camera to Mode 1. 2. Set all secondary cameras to Mode 0, (auto-trigger disabled). 3. Connect the auto-trigger signal of the primary camera to the trigger inputs of the secondary cameras.

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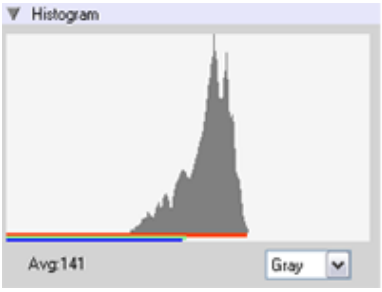
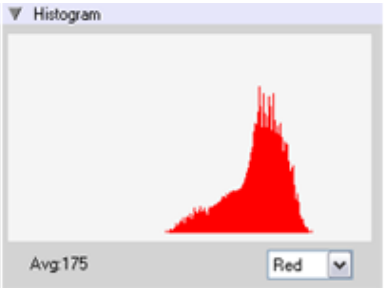
9.4 Image Processing Effects and Filters

Histogram

When the Image Tools dialogue window appears, an image histogram will be displayed in the window. The image histogram is a graphical representation of the distribution of RGB and/or luminance values in an image. Each of the values appear on the horizontal axis from dark to light, (left to right), as shown in the Histogram graphics below. The vertical axis indicates the number of pixels of that value at each point. At a point where there are many pixels of a value, the corresponding line spikes; where there are no pixels, it lies at the bottom of the graph.

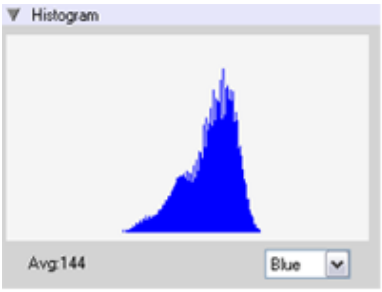


gray scale values (All pixels)
Color Camera

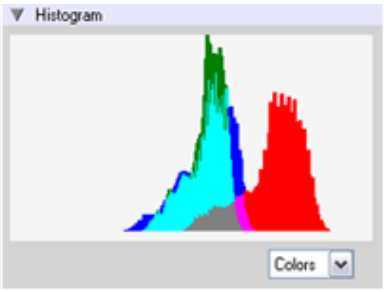


Red pixel values
Color Camera

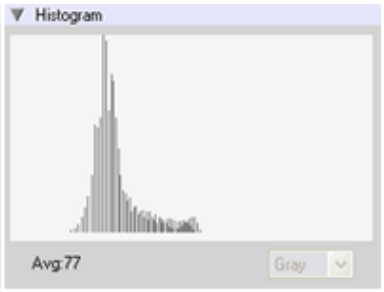
Green pixel value
Color Camera



Blue pixel values
Color Camera



All color values (All pixels)
Color Camera



gray scale values (All pixels)
Monochrome Camera

Adjustments (Image Processing Effects)

Move the appropriate slider, to apply the desired image processing adjustment to the images being displayed in the active Preview or Playback Panel. The sliders can be used to adjust the following image processing adjustments:

Brightness

This slide bar is used to adjust the brightness of monochrome or color images. The factory default value is set to 0 (zero). Moving the slide bar to the left, in the negative direction from 0, results in the images being displayed darker, while moving the slide bar to the right or in a positive direction from 0 results in the images being displayed lighter.

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Image above set to: (0 - Default) **(-33)** **(33)**

Selectable Range: -100 to 100

Contrast

This slide bar is used to adjust the contrast of monochrome or color images. The factory default value is set to 1. Moving the slide bar to the left from 1, results in the images being displayed with less contrast, while moving the slide bar to the right from 1 result in the images being displayed with greater contrast.

Image above set to: (1.00 - Default) **(0.50)** **(50.00)**

Selectable Range: 0 to Infinite

NOTE

By increasing the contrast setting the noise level will increase as well, so only increase as much as necessary to get a satisfactory image. Being a subjective setting only the user can determine what satisfactory is.

Gamma

This slide bar is used to adjust the gamma correction of monochrome or color images. The factory default value is set to q.22. Moving the slide bar to the left from 2.22, results in the images being displayed with fewer gamma corrections, while moving the slide bar to the right from 2.22 results in the images being displayed with greater gamma correction.

Image above set to: (2.22 - Default) **(0.25)** **(5.01)**

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Selectable Range: 0.10 to 10.0

Saturation (Color Cameras Only)

This slide bar is used to adjust the color saturation of the images being displayed. The factory default value is set to 0 (zero). Moving the slide bar to the left, in the negative direction from 0, results in the images being displayed with less brilliant color, while moving the slide bar to the right or in a positive direction from 0 results in the images being displayed with more brilliant color.

Image above set to: (0 - Default) **(-100)** **(100)**

Selectable Range: -100 to 100

Hue (Color Cameras Only)

This slide bar is used to adjust the color hue of the images being displayed. The factory default value is set to 0 (zero). Moving the slide bar to the left, in the negative direction from 0, results in the images being displayed with fewer color hues, while moving the slide bar to the right or in a positive direction from 0 results in the images being displayed with more color hue.

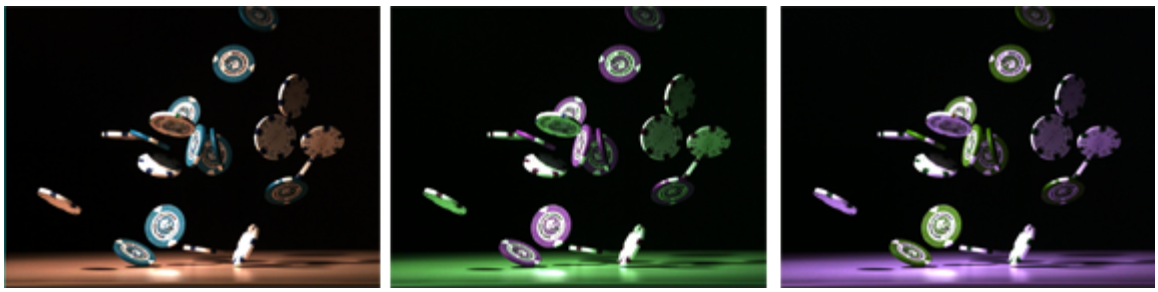

Image above set to: (0 - Default) **(-100)** **(100)**

Selectable Range: -180 to 180

White Balance

Move the appropriate slider manually to apply the desired white balance adjustment to the images displayed in the active Preview or Playback Panel. These slide bars are used to perform a manual white balance to obtain a white color on an area you know should be white, or, simply to vary the values of red and blue in the image.

Selectable Range: 0.10 to 10.0

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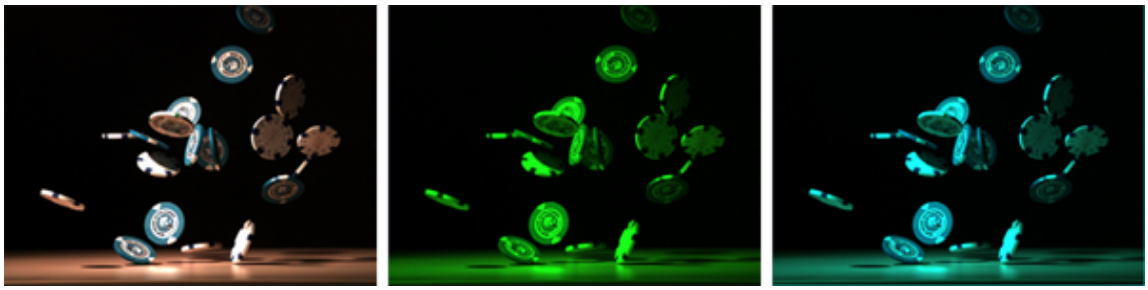
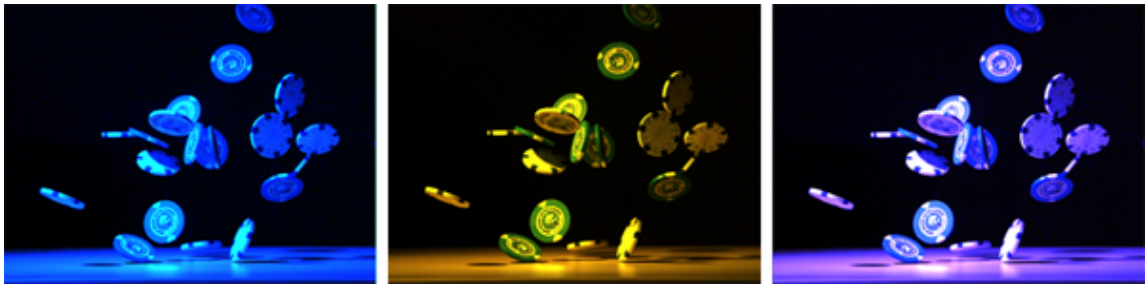


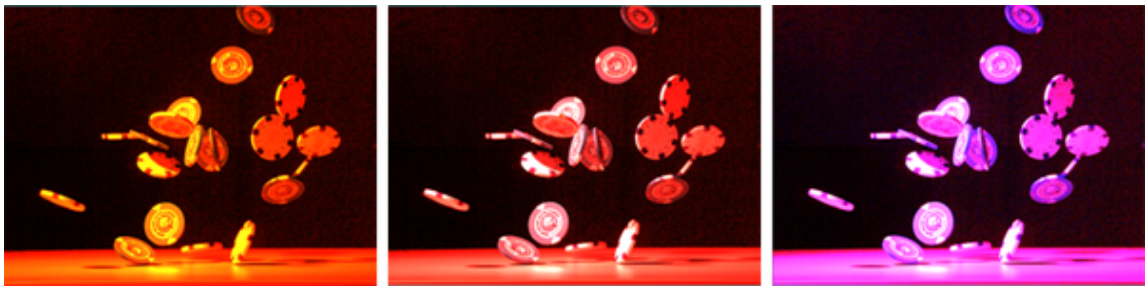
Above:

Red set to: (1.00 - Default)	**(0.10)**	**(0.10)**
Blue set to: (1.00 - Default)	**(0.10)**	**(1.00)**



Above:

Red set to: (0.10)	**(1.00)**	**(1.00)**
Blue set to: (10.0)	**(0.01)**	**(10.0)**



Above:

Red set to: (10.0)	**(10.0)**	**(10.0)**
Blue set to: (0.10)	**(1.00)**	**(10.0)**

Selectable Range: 0.100 to 10.00

For an instruction on how to perform a White Balance Adjustment automatically, see: Step-by-Step Procedures>Preview/Playback Panel Procedures/Performing a White Balance Adjustment.

Sensitivity

This slider is used to select the dynamic range of the image, (the desired number of bits per pixel), to be displayed on-screen by moving the slider.

- To select the low order, the least significant, bits slide the slider to the left.
- To select the high order, most significant bits, slide the slider to the right.
- To select a range somewhere in the middle simply adjust the slider to the desired gray scale range.

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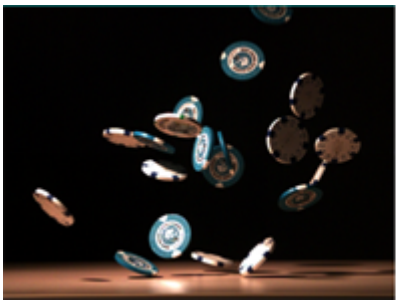
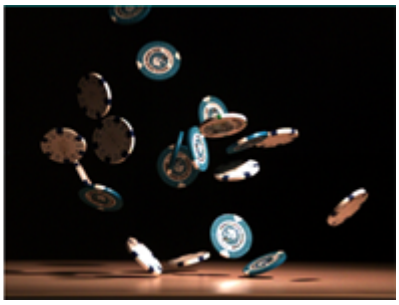
Rotate Image

Placing a check mark in this enable box will rotate the image as follows:

Flip H

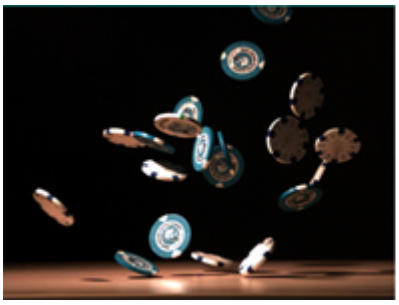
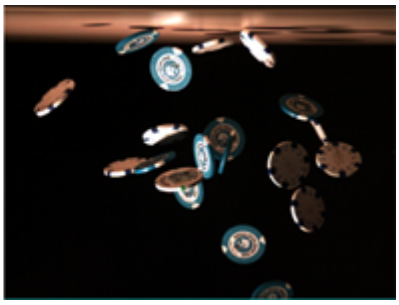
Displays the image as a mirrored image, the image flips horizontally.

Original **Flip H**

Flip V

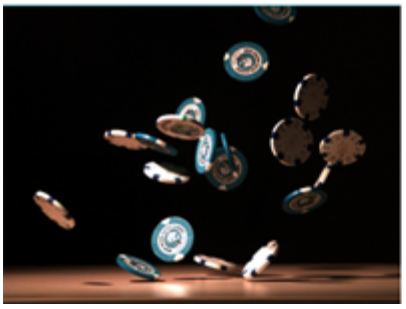
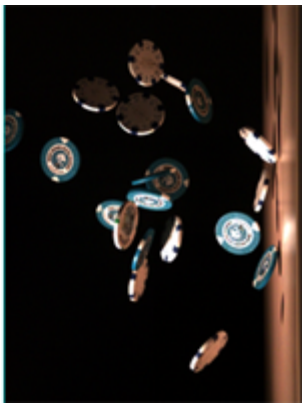
Displays the image upside-down, the image flips vertically.

Original **Flip V**

Rotate

Rotates and displays the image 90° counter-clockwise from the original image.

Original **Flip H**

Clockwise

Rotates and displays the image 90° clockwise from the original image.

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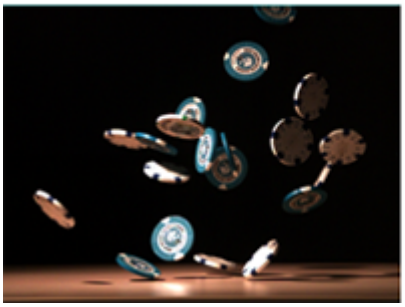


Original

Flip H

Filter

Select the desired filter, to be applied to the image or cine file in the active Preview/Playback Panel, from the Filter pull-down selection list. The Phantom Camera Control application provides the following image filtering algorithms:

None

Used to display the images as they were originally recorded, prior to applying any of the other filtering techniques to the images.

Smooth Gauss 3x3 or 5x5

Used to blur or “smooth” the images based on a 3-by-3-, or 5-by-5-pixel Gaussian filter.

Sharpen

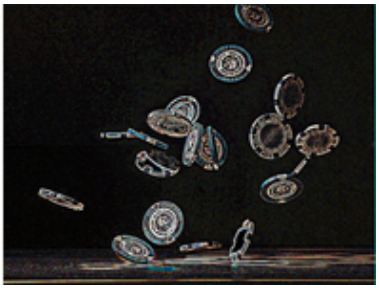
Used to emphasize the edges within an image. The result is that the image appears to have increased sharpness.

Edge Hipass 3x3 or 5x5

Used to enhance or isolate 3-by-3-, or 5-by-5-pixel transition areas, or "edges," in an image by enhancing the high-frequency detail.

Applied filter: None

Edge Hipass 3x3



Edge Hipass 5x5

Edge Laplacian 3x3 of 5x5

The 5x5 Laplacian used is a convoluted mask to approximate the second derivative, unlike the Sobel method which approximates the gradient. And instead of two 3x3 Sobel masks, one for the x and y directions, Laplace uses one 5x5 mask for the 2nd derivative in both the x and y directions. However, because these masks are approximating a second derivative measurement on the image, they are very sensitive to noise.

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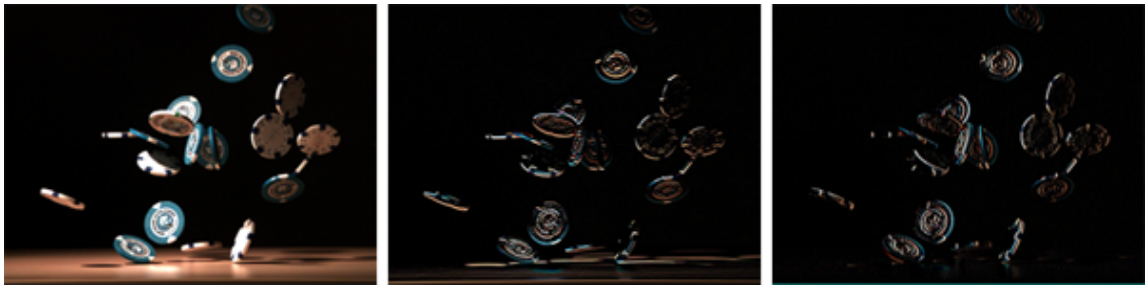
Applied filter: None | Edge Laplacian 3x3 | Edge Laplacian 5x5

Edge Prewitt Horizontal or Vertical

Prewitt is a method of edge detection in computer graphics, which calculates the maximum response of a set of convolution kernels to find the local edge orientation for each pixel. Various kernels can be used for this operation. The whole set of 8 kernels is produced by taking one of the kernels and rotating its coefficients circularly. Each of the resulting kernels is sensitive to an edge orientation ranging from 0° to 315° in steps of 45°, where 0° corresponds to a vertical edge.



Applied filter: None | Edge Prewitt Horizontal | Edge Prewitt Vertical

The maximum response for each pixel is the value of the corresponding pixel in the output magnitude image. The values for the output orientation image lie between 1 and 8, depending on which of the 8 kernels produced the maximum response.

This edge detection method is also called edge template matching, because a set of edge templates is matched to the image, each representing an edge in a certain orientation. The edge magnitude and orientation of a pixel are then determined by the template that matches the local area of the pixel the best.

The Prewitt edge detector is an appropriate way to estimate the magnitude and orientation of an edge. Although differential gradient edge detection needs a rather time-consuming calculation to estimate the orientation from the magnitudes in the x- and y-directions, the Prewitt edge detection obtains the orientation directly from the kernel with the maximum response. The set of kernels is limited to 8 possible orientations. However, experience shows that most direct orientation estimates are not much more accurate. On the other hand, the set of kernels needs 8 convolutions for each pixel, whereas the set of the kernel in gradient method needs only 2, one kernel being sensitive to edges in the vertical direction and one to the horizontal direction. The result for the edge magnitude image is very similar with both methods, provided the same convolving kernel is used.

Edge Sobel Horizontal or Vertical

The Sobel operator is an operator used in image processing, particularly within edge detection algorithms. Technically, it is a discrete differentiation operator, computing an approximation of the gradient of the image intensity function. At each point in the image, the result of the Sobel operator is either the corresponding gradient vector or the norm of this vector.

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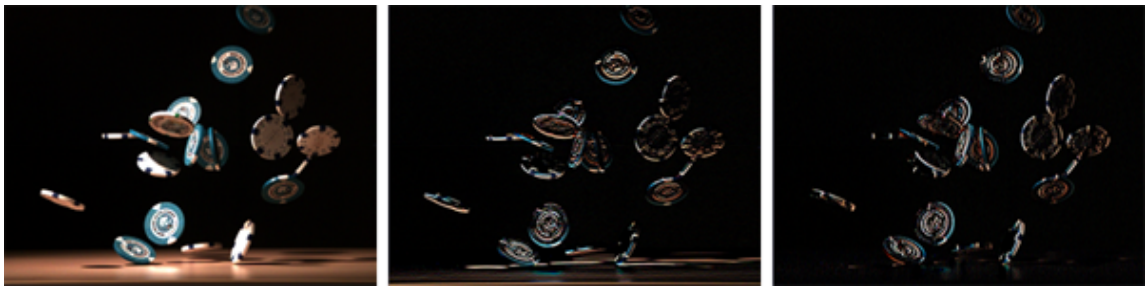

Applied filter: None **Edge Sobel Horizontal** **Edge Sobel Vertical**

In simple terms, the operator calculates the gradient of the image intensity at each point, giving the direction of the largest possible increase from light to dark and the rate of change in that direction. The result, therefore, shows how "abruptly" or "smoothly" the image changes at that point, and therefore, how likely it is that part of the image represents an edge, as well as how that edge is likely to be oriented. In practice, the magnitude (likelihood of an edge) calculation is more reliable and easier to interpret than the direction calculation.

Mathematically, the gradient of a two-variable function (here the image intensity function) is at each image point a 2D vector with the components given by the derivatives in the horizontal and vertical directions. At each image point, the gradient vector points in the direction of the largest possible intensity increase, and the length of the gradient vector corresponds to the rate of change in that direction. This implies that the result of the Sobel operator at an image point which is in a region of constant image intensity is a zero vector and at a point on an edge is a vector which points across the edge, from darker to brighter values.

User Filter

Presently disabled.

Grid

Enable, (check), the Grid enable box to super-impose 7 horizontal lines and 7 vertical line, evenly spaced over the Preview or Playback Panels to form an 8-row; 8-column grid.

Cross

Enable, (check), the Cross enable box to super-impose a horizontal line in the middle, and a vertical line in the center, of the Preview or Playback Panels.

Default Button

Click the Default button to reset all the image processing Tools back to factory default settings.

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9.5 Phantom CineMag Operational Modes

Phantom cameras that support a Phantom CineMag can operate in one of two operational mode, including:

Loop

When the camera is in the Loop Mode, the Phantom camera stores the recorded image data into the camera's DRAM buffer. In this mode, the Phantom CineMag operates like any other Flash card, after a cine file, (image data), is recorded into the camera's DRAM frame buffer, the end-user manually saves the image data it into the Phantom CineMag by initiating the Save to Flash command window, which can be accessed via the Cine Pull-down Menu.

NOTE

This mode supports recording up to the maximum Sample rate.

R/S (Run/Stop)

In Run/Stop Mode the image data is recorded directly into the Phantom CineMag. For example, a Phantom HD will store the image data at a rate up to 450fps at the HD resolution of 2048 x 1080.

9.6 Phantom File Naming Convention

Even a relatively short movie result in a very large number of image files that later ought to be individually retrievable; naming these files by hand is impractical. The unique file naming in the Phantom camera is automatic. In order to provide this function in the Phantom software it was necessary for Vision Research to develop a small "language" for specifying file names using a few special characters that are legal for filenames but seldom used. The Phantom software recognizes these characters and substitutes them with different counters from the software.

Insert the Cine File Number into the Path and/or File Name(s)

Description

Used to insert the cine file number to the path and/or file names. The single digit number specifies the number of digit places appended to the root file name.

The @ character can be used within both path names and file names. The cine number counter is initialized to zero each time the software is started and incremented by 1 each time a cine is saved to a drive.

Syntax

@ followed by a single digit

Single Digit Range

1 through 8

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Denote a Session Number into the Path and/or File Name(s)

Description

Used to denote a session number, if desired, in the path and/or file names. The single digit number specifies the number of digit places appended.

Syntax

$ followed by a single digit

Single Digit Range

1 through 8

Insert the Current Date and Time within the File Name(s) Only

Description

Used to insert the current date and time within the file names only. The digit number “8” specifies the number digits places used to report date in the file.

Syntax

~ followed by a single digit

Single Digit Range

8 only

Inserts an Image Number into the File Name (Starting from One)

Description

Used to inserts the image number in the file name. The single digit number specifies the number of digit places appended to the root file name.

Use a separate folder for each recording sequence to prevent the single images of future recording from overwriting your stored images because of duplicate file names.

CAUTION

When saving your files as a series of still images, you must follow this naming convention or the individual images will be overwritten every time the camera stores additional Images.

Syntax

+ followed by a single digit

Single Digit Range

1 through 8

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Insert an Image Number in the File Name (Starting with the First Frame's Image Number)

Description

Used to insert the image number in the file name, starting from the first frame's number. The single digit number specifies the number of digit places appended to the root file name. Remember to consider the minus sign in the image number, too.

Syntax

! followed by a single digit

Single Digit Range

1 through 8

Automatically Group Individual Still Image Series into Individual Folders with Unique Folder Names

Description

Use this procedure to automatically group your individual still image series in individual folders with unique names. Using a separate folder for each recording sequence prevents the single images of future recording from overwriting your stored images because of duplicate file names.

CAUTION

When saving your files as a series of still images, you must follow this naming convention or individual images will be overwritten every time the camera stores additional Images.

Syntax

+ followed by a single digit

Single Digit Range

1 through 8

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9.6.1 Phantom File Naming Convention Examples

Create a Directory to Hold Individual Images Extracted from the Original Cine

If the file name pattern is C:\NewDir\Img+5.tif

Upon execution of this routine, this simple file name entry will create a new directory on your C:\ drive named "NewDir" to hold the individual .tif images that will be extracted from the original cine file. You may change the name "NewDir" to any name you like.

NOTE

Multiple cine file may be selected.

The Img+5.tif portion of the naming structure will instruct the Phantom software to save the files in the order, they were taken adding a number starting at 1. "Img" in the name is the root designator for the images. You may change "Img" to Pic for picture, Frm for frame or any other characters that fit your needs. The "+5" instructs the application to append 5 character places to each image.

Upon completion of this routine, you will find a directory on your C:\ drive named "NewDir" and the files in that directory will look as follows:

Img00001.tif

Img00002.tif

Img00003.tif

Automatically Name a New and Unique Directory, and Sequentially Number Individual Image Files Stored Inside

A file name using this "+" method could use the "@" symbol to automatically name a new and unique directory, and the "+" sign to sequentially number the individual image files that will be stored inside.

Example: C:\Phantom\yourdirname@2\PIC+4.BMP

Result in: C:\Phantom\yourdirname01\PIC0001.BMP (Directory with the following image file stored inside)

C:\Phantom\yourdirname01\PIC0000.BMP

C:\Phantom\yourdirname01\PIC0001.BMP

C:\Phantom\yourdirname01\PIC0002.BMP

In this example, the first file will be saved to drive "C" in the "Phantom" directory. The first recording will create a folder in this Phantom directory named "yourdirname" (or whatever legal name you choose before the "@" symbol), and the number "00" will be added. Individual single image files with the filename plus an image number from 0000 to the final number in the sequence plus the file extension (in this case BMP), will be stored in this sub directory. The next trigger will start the process again, and the next save to drive C:\Phantom will create a sub directory "yourdirname" and append the name with the number 01. Individual images will be saved as described above.

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Create Multiple Image Files from a Cine (Starting with the First Frame's Image Number)

To create multiple images from a cine file – let's say cine1.cine – containing a range of frames from -10 to 2, you can specify the generic file name like this:

Example: imag!4

The images will be saved in the same folder with the one in which the cine file "cine1.cine" is in:

imag-0010
imag-0009
imag-0008
…
imag0000
imag0001
imag0002

Create Multiple Image Files (Starting with the First Frame's Image Number) into Sub-folders within the Original Folder Location

You can indicate, not only file names, but also a new directory or the full path name, using the language described. For example, when converting several file formats from files within a single folder – cine1.cin, avi1.avi – containing a range of frames from –10 to 2, you can specify the following Files in the Multiple Convert Destination dialog box:

Example: c:\cines\imag!4

Phantom will create a cines file folder if it does not already exist, and images will be saved like this:

c:\cines\cine1\imag-010
c:\cines\cine1\imag-009
…
c:\cines\cine1\imag0001
c:\cines\cine1\imag0002
c:\cines\avi1\imag-010
c:\cines\avi1\imag-009
…
c:\cines\avi1\imag0001
c:\cines\avi1\imag0002

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Create Multiple Cine Files into Sub-folders within the Original Folder Location

You can also introduce a counter of cine files, using the @ sign. Using the same convention as the one just mentioned, if you specify:

Example: c:\cine@2\imag!4

Results in:

c:\cine00\cine1\imag-010
c:\cine00\cine1\imag-009
…
c:\cine00\cine1\imag0001
c:\cine00\cine1\imag0002
c:\cine01\avi1\imag-010
c:\cine01\avi1\imag-009
…
c:\cine01\avi1\imag0001
c:\cine01\avi1\imag0002

Create Multiple Image Files (Starting from One)

If you prefer a counting of images starting from 1, here is an example for converting the file cine1.cine with the frame range from –10 to 2:

Example: c:\cines\imag+4, and you will get:

c:\cines\imag0001
c:\cines\imag0002
…
c:\cines\imag0012
c:\cines\imag0013

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9.7 Phantom STG, (Serial Tag Number), File

Each Phantom camera has a unique serial tag number file. This file is known as the camera's '.STG' file. The .STG file contains factory calibrations and settings essential for the proper operation of your Phantom camera. The Phantom installation CD, supplied with each new or newly serviced camera, includes the '.stg' file for your camera.

Serial Tag Files use the file extension .STG and reside in the Phantom directory on the controlling computer's hard drive. These files are specific to each camera manufactured and store the factory settings and various lookup tables for the image sensor based on the 4-Digit Camera ID number. The information in this file is also stored (duplicated) in the camera's non-volatile flash memory. Under normal camera operation, this information is read by the Phantom application each time the software is started or each time a camera is accessed over the network. When started, the application first tries to read the factory settings from the computer .STG file. If it doesn't find the appropriate .STG file on the computer, it reads the settings from the camera.

On the flip side, if the Phantom application is started or if the camera is accessed over the network and no .STG file resides on the hard drive, the Phantom application will automatically create the .STG file on the controlling computer's hard drive using the information residing in the camera flash memory.

If for any reason the Phantom application cannot read the .STG information from the camera flash or from a file in the Phantom directory on the hard drive then the software will prompt the user for intervention. If the proper .STG file is not available the application can load a default set of information. If the default information is written to the flash the camera will still operate but the image quality will be less than optimum.

CAUTION

Never use an outdated .STG file. Never mix .STG files. Using .STG files from other cameras may cause serious damage.

Vision Research keeps copies of .STG files on record and if needed a copy can be obtained via email by contacting us.

Vision Research recommends making a backup copy of your camera's .STG file to store in a safe place. We also recommend placing a copy of this file in a temporary folder somewhere on your hard drive in the event you need to restore the camera's factory calibration settings quickly .

When the camera is first connected to the controller, it will automatically download the '.stg' file to the Phantom folder. Normally, this folder is C:\Program Files\Phantom. Therefore, you MUST copy the file from the CD, and use Windows Properties to disable the READ ONLY attribute of the .STG file after it's copied to the hard drive.

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9.8 Supported File Formats

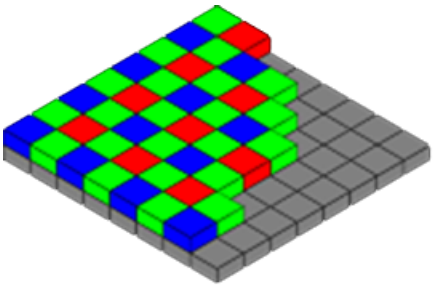
A cine file, or movie, may contain hundreds of pictures, while an image file contains a single picture extracted from a cine file. Vision Research recommends that you use the Cine RAW format, unless there is a real need to use one of the other formats. Following are brief descriptions of the advantages and disadvantages of the various supported file formats.

IMPORTANT DEFINITIONS

Color interpolation (Demosaicing)

Color images usually contain three color components for each pixel (Red, Green, Blue). In order to produce color images, digital cameras should be able to measure color levels for all three components in each pixel of the image. Hence, three different sensors would be required.

Since this approach is expensive and very complicated to implement, most cameras use only one sensor plus a Color Filter Array (CFA). The CFA is a grid that selectively filters the light by wavelength range. The image below contains such a filter, called the Bayer CFA.



Bayer Color Filter Array

Thus, the camera sensor will produce an array on values with one value per pixel. Each value represents a specific color level (red, green or blue). Such an image is usually called uniterpolated or RAW image.

In order to obtain a full color image from the RAW image, a special processing is required, called color interpolation or demosaicing. Analyzing each pixel and its neighbors, a color interpolation algorithm basically reconstructs the missing color components and produces the desired color image.

Raw

The term “RAW” generally refers to something unprocessed, unrefined. In digital video and digital photography, there are two contexts RAW is most often used:

- When referring to how data is stored in an image file.

  In this context, a RAW file generally stores an image as a stream of bytes without using any compression or special technique. By default, the file contains no additional data. However, some RAW files may support adding a header with minimal information such as image size or bit depth. Vision Research .RAW format is an example for this category.

- When referring to what kind of data is stored in an image file.

  A RAW file format may also refer to a file format that contains the original, unprocessed data from the image sensor of a digital camera. A RAW file is not immediately ready for use, but it contains all additional information for processing it and further using the captured image. DNG is an example of a RAW file format.

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SUPPORTED FILE FORMATS

Cine (*.cine)

Advantage:

The Cine format is a Vision Research proprietary file format very similar to the Cine RAW format except that the colors are interpolated and every pixel holds all three color components RGB. It will store 8 or 16-bit images. The playback speeds are faster than Cine RAW because the colors are already interpolated.

Disadvantage:

It is usually about three times the size of Cine RAW file and takes a bit longer to save.

Cine JPEG (*.cci)

Advantage:

The Cine JPEG format uses a lossy compression routine to compress the images from the cine file while retaining the timing and other information within the file. It will store only 8 bit images. It results in the smallest file size but there is a loss in the image quality, depending on the quality factor you chose at save.

Disadvantage:

It takes a bit more time to save the cine file as the JPEG compression is performed. Not all third party software analysis packages will work with this format, image is altered and some details can be lost.

Cine RAW (*.cine)

Advantage:

The Cine RAW format is a Vision Research proprietary file format that has all the settings and timing information stored within the file. It will store 8 or 16-bit images. The images stored on 16 bits can have a smaller number of used bits: 10, 12 or 14. The images are saved as read from a sensor and the format is very compact. The save time is the best of all the formats offered in the Phantom application. Cine RAW files are uninterpolated, every pixel stores information about one color.

Disadvantage:

Each image needs to be interpolated on the fly during playback, that is, the missing two colors are computed by interpolating the neighbor colors, so the playback speed is slightly slower than some of the other formats and is dependent on the configuration of your computer system.

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Cine RAW Packed

The packed cine files are smaller and faster to save. Packed files can be converted in unpacked RAW cine files or in DNG format (packed or unpacked).

NOTE

You can save a packed RAW cine file can only be saved from a Phantom CineMag by checking the Packed option in the Save Cine dialog box.

AVI (*.avi)

Advantage:

The Audio Video Interleaved (AVI) format uses the AVI CODECS to save the file in a universal format used by several video playback packages. This universal format makes it easy to pass along to the end user for viewing since almost every PC has a viewer built into the operating system. The timing and setting information (“metadata”) is stored in a separate file known as the cine header file (.chd) or in a XML file. The AVI file can be played back within the Phantom application with the information intact.

Disadvantage:

Files saved in the AVI format are converted to 8-bit.

Multipage TIFF (*.tif)

Advantage:

Some branches of the military use primarily the multipage TIFF format, and there are third party software packages that use this format for image analysis. The timing and setting information is stored in a cine header file (.chd) or in a XML file and the TIFF file can be played back within the Phantom application with the information intact. The file size is the same as the Phantom Cine format.

Disadvantage:

The Multipage TIFF format has a 2 gigabyte file size limit, so on large memory cameras the customer will need to save the large cine files in segments. Files saved in the multipage TIFF format are converted to 8 bits.

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MXF (*.mxf)

Advantage:

The MXF format, both NTSC and PAL, are used to save the camera cine images in a format that several common video editing suites use. This allows the camera images to be easily edited into

standard video productions. The images are lossy compressed. Care must be taken to set the aspect ratio to that of the video display that the images will be viewed on. The timing and setting information is stored in a cine header file (.chd) or in a XML file.

Disadvantage:

Files are converted to 8 bits. The MXF format will not playback in the Phantom application. The resulting files have the extension of .mxf and there is no distinction in the filename between NTSC and PAL.

QuickTime (*.mov)

Advantage:

This is a universal file format that can be played back in several third party software packages that are commonly used by the Apple computers end users. The file size is the same as the Cine format. Only the uncompressed version of this format was implemented. The timing and setting information is stored in a cine header file (.chd) or in a XML file.

Disadvantage:

Files are converted to 8-bit. The MOV format will not play back in the Phantom application.

Windows BMP (*.bmp)OS/2 BMP (*.bmp) - one image per file

Advantage:

All still or video cameras produce raster images. Bitmap (or raster) images are made up of pixels in a grid. Each pixel is assigned a color value. All these tiny dots of color come together to form the images you see. Bitmap images are literally maps of the grid of pixels and their color assignments. Bitmap files easily convert to other formats. BMP is the built-in format of Windows operating system.

Disadvantage:

BMP supports only 8 bits per pixel (24 bits per pixel on color images).

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PCX (*.pcx)

Advantage:

The PCX image format is one of the oldest raster formats. It was originally designed by ZSoft to be used by PC Paintbrush for MS-DOS. Microsoft later acquired the right to use the PCX format for Microsoft Paintbrush for Windows indirectly increasing the format's popularity. PCX can be used for graphic data operations.

Disadvantage:

PCX does not compress images very effectively, but it retains all image information. As such, PCX files are usually very large and are unsuitable for very large details. Due to its inefficient compression scheme and the advent of other image formats, PCX has lost some of its popularity.

TGA (*.tga)

Advantage:

This format (Targa or TGA) supports any image dimensions and color depth of 1 to 32 bits. As the image format's popularity increased, this format, TGA (Targa), has been migrated to many other platforms and applications. The Targa format is used by several high-end paint and CAD programs.

The TGA format is a format for defining raster or bitmap images. Targa supports color maps, alpha channel, gamma value, postage stamp image, textual information and developer-definable data. Unlike other image formats, there are relatively few variations. Various compression models are supported. Targa images exist in both compressed and uncompressed formats.

The TGA format is probably the most universally supported 24-bit and 32-bit file format for PC applications. The 32-bit Targa format contains 24 bits of color data and 8-bits of transparency data. Color support ranges from black and white, indexed and RGB color.

Disadvantage:

Since Windows does not recognize 16-bit and 32-bit depths, some applications may treat them as 24- bit images. A 16-bit image will be up-graded to a 24-bit image while a 32-bit image will be downgraded to a 24-bit image.

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TIFF (*.tif)

Advantage:

TIFF (Tagged Image File Format) is one of the most popular and flexible of the current public domain raster file formats. TIFF is primarily designed for raster data interchange. TIFF's main strengths are a highly flexible and platform-independent format that is supported by numerous image processing applications. Since developers of printers, scanners and monitors designed it, it has a very rich space of information elements for colorimetry calibration, gamut tables, etc. Such information is also very useful for remote sensing and multi-spectral applications.

Another feature of TIFF that is also useful is the ability to decompose an image by tile rather than scan lines. This permits much more efficient access to very large imagery, which has been compressed (since one does not have to decompress an entire scan line).

Disadvantage:

There is no provisions in TIFF for storing vector graphics, text annotation, etc. (although such items could be easily constructed using TIFF extensions TIFF.). TIFF is based on file-offsets, so that it is not easily "streamable" in the way JPEG JFIF streams are.

A common complaint of TIFF is rooted in its flexibility. TIFF uses a 4-byte integer file offset to store image data, with the consequence that a TIFF file cannot have more than 4 Gigabytes of raster data (and some files have begun to approach this boundary).

LEAD (*.cmp)

The LEAD CMP format was created by LEAD Technologies, Inc., and it utilizes the patented CMP compression. CMP compression delivers a much smaller file size and better image quality than other compression techniques.

LEAD JTIF (*.jtf)

Refer to LEAD and JTIF.

LEAD JFIF (*jff)

Refer to LEAD.

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JPEG (*.jpg)

Advantage:

The Joint Photographic Experts Group Format (JPEG) format allows for control on the compression quality. This means that you can opt for a smaller image with less detail or a larger image with more detail. JPEG handles gradients well and is useful for images with subtle color borders such as photographs.

Disadvantage:

JPEG files are typically large files, and the JPEG formatted images lose quality rapidly as they are compressed, usually introducing ‘noise’ and distortion into the image. The loss of image quality is usually not worth the reduction of file size.

JTIF (*.jpg)

JTIF (JPEG File Interchange Format) is just a file format for a compressed JPEG image. TIFF can actually store its pels compressed in a wider variety of ways, including JPEG. JTIF is the common JPEG file format seen in *.jpg files.

RAW (*.RAW)

RAW is a file format used in Vision Research applications for storing an interpolated image as an array of bytes. For each pixel, three values are written to the file in ASCII or Binary format, depending on the user option.

Usually, a RAW file contains just the array of bytes without any additional information. Nevertheless, both image size and color depth can optionally be included in the file header.

Because of its simplicity, RAW files are rather suitable for in house post processing applications where acquisition parameters are well known and controlled values.

This format is a Vision Research proprietary format that contains only pixel values. The file exists for developers of custom software.

DNG (*.dng)

DNG (Digital Negative) is a non-proprietary file format developed by Adobe Systems and used for storing RAW images. DNG is TIFF/EP standard compatible.

A DNG file contains unprocessed, uninterpolated data. Additional information about acquisition and processing parameters is stored separately in the file as metadata.

One great advantage of the DNG file format is its flexibility: the end-user has access to the original sensor data and can modify a wide range of parameters such as color interpolation, white balance, black level, contrast, saturation, etc.

On the other hand, each DNG needs to be processed before being used, which not only that is time consuming, but also requires specialized software tools for handling DNG files.

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DPX (*.dpx)

Digital Picture Exchange (DPX) is a common file format for digital film work and is an ANSI/SMPTE standard (268M-2003). The file format is most commonly used to represent the density of each color channel of a scanned negative in a 10-bit log format where the gamma of the original camera negative is preserved as taken by a film scanner. Other common video formats are also supported. DPX provides a great deal of flexibility in storing color and other information for exchange between production facilities. Multiple forms of packing and alignment are possible.

The DPX file format was originally derived from the output file format (.cin) of the Kodak Cineon 'FIDO' film scanner, and has been published by SMPTE as ANSI/SMPTE 268M-2003 (originally was version 1 268M-1994).

Packed

Packed cine files are smaller and faster to save. You can save a packed RAW cine file only from a Phantom CineMag. Packed files can be converted as unpacked RAW cine files or in DNG format,(packed or unpacked).

A new type of Cine RAW file – Packed cine raw – can be saved from a Phantom CineMag. When playing back a Packed cine file, the Play>Cine Info>Bits per color value will be displayed with a “P” appended to it, (for example, 10 P).

NOTE

In order to get packed cine files compatible with previous versions of the Phantom Camera Control application, convert the packed cines and uncheck the Packed option in Save cine dialog box.

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9.9 Supported Video System Formats

The types of video signal formats Phantom camera's will transmit to a monitor, include:

Analog NTSC

When selected the camera will transmit the NTSC (National Television System Committee) video signal format; 59.94 half frames (called fields) per second and 525 lines per field, (480 lines in each field are the image, and the last 45 are the "vertical blanking interval" (VBI), designed to give the electron gun time to reposition itself from the bottom of the last field to the top of the next), to an attach compatible monitor.

NOTE

NTSC is the analog television system in use in Canada, Japan, South Korea, the United States, and some other places, mostly in the Americas.

Analog PAL

When selected the camera will transmit the PAL (Phase Alternating Line) video signal format; 25 fields per second and 625 lines per field, to an attached compatible monitor.

NOTE

PAL is the analog television system used in most of Western Europe, Australia and other countries.

HDTV 720p60

When selected the camera will transmit 720 lines of vertical resolution, with a horizontal resolution of 1280 pixels and an aspect ratio of 16:9, implying a horizontal (display) resolution of 1280 lines and a frame resolution of 1280 × 720 or about 0.92 million pixels; progressively scanned, (non-interlaced); at a frame rate of 60Hz to an attached HD compatible monitor.

HDTV 720p59.9

When selected the camera will transmit 720 lines of vertical resolution, with a horizontal resolution of 1280 pixels and an aspect ratio of 16:9, implying a horizontal (display) resolution of 1of 1280 lines and a frame resolution of 1280 × 720 or about 0.92 million pixels; progressively scanned, (non-interlaced); at a frame rate of 59.94Hz to an attached HD compatible monitor.

HDTV 720p50

When selected the camera will transmit 720 lines of vertical resolution, with a horizontal resolution of 1280 pixels and an aspect ratio of 16:9, implying a horizontal (display) resolution of 1280 lines and a frame resolution of 1280 × 720 or about 0.92 million pixels; progressively scanned, (non-interlaced); at a frame rate of 50Hz to an attached HD compatible monitor.

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HDTV 1080p30

When selected the camera will transmit 1080 lines of vertical resolution, with a horizontal resolution of 1280 pixels and an aspect ratio of 16:9, implying a horizontal (display) resolution of 1920 dots across and a frame resolution of 1920 × 1080 or over two million pixels; progressively scanned, (no-interlaced); at a frame rate of 30Hz to an attached HD compatible monitor.

HDTV 1080p29.9

When selected the camera will transmit 1080 lines of vertical resolution, with a horizontal resolution of 1280 pixels and an aspect ratio of 16:9, implying a horizontal (display) resolution of 1920 dots across and a frame resolution of 1920 × 1080 or over two million pixels; progressively scanned, (non-interlaced); at a frame rate of 29.97Hz to an attached HD compatible monitor.

HDTV 1080p25

When selected the camera will transmit 1080 lines of vertical resolution, with a horizontal resolution of 1280 pixels and an aspect ratio of 16:9, implying a horizontal (display) resolution of 1920 dots across and a frame resolution of 1920 × 1080 or over two million pixels; progressively scanned, (non-interlaced); at a frame rate of 25Hz to an attached HD compatible monitor.

HDTV 1080p24

When selected the camera will transmit 1080 lines of vertical resolution, with a horizontal resolution of 1280 pixels and an aspect ratio of 16:9, implying a horizontal (display) resolution of 1920 dots across and a frame resolution of 1920 × 1080 or over two million pixels; progressively scanned, (non-interlaced); at a frame rate of 24Hz to an attached HD compatible monitor.

HDTV 1080p23.9

When selected the camera will transmit 1080 lines of vertical resolution, with a horizontal resolution of 1280 pixels and an aspect ratio of 16:9, implying a horizontal (display) resolution of 1920 dots across and a frame resolution of 1920 × 1080 or over two million pixels; progressively scanned, (non-interlaced); at a frame rate of 23.976Hz to an attached HD compatible monitor.

NOTE

1080p is currently the digital standard for filming digital motion pictures.

HDTV 1080i30

When selected the camera will transmit 1080 lines of vertical resolution, with a horizontal resolution of 1280 pixels and an aspect ratio of 16:9, implying a horizontal (display) resolution of 1920 dots across and a field resolution of 1920 × 1080 or over two million pixels; interlaced scanned, at a field rate of 30Hz to an attached HD compatible monitor.

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HDTV 1080i29.9

When selected the camera will transmit 1080 lines of vertical resolution, with a horizontal resolution of 1280 pixels and an aspect ratio of 16:9, implying a horizontal (display) resolution of 1920 dots across and a field resolution of 1920 × 1080 or over two million pixels, interlaced scanned at a field rate of 29.97Hz to an attached HD compatible monitor.

HDTV 1080i25

When selected the camera will transmit 1080 lines of vertical resolution, with a horizontal resolution of 1280 pixels and an aspect ratio of 16:9, implying a horizontal (display) resolution of 1920 dots across and a field resolution of 1920 × 1080 or over two million pixels, interlaced scanned at a field rate of 25Hz to an attached HD compatible monitor.

NOTE

Progressive segmented Frame (PSF) is a High Definition video format used to store progressive content on interlaced media.

Each progressive frame is segmented into two interlaced fields without inter-field motion, or "combing". PSF is an alternative to 3:2 pull-down, wherein certain frames are "pulled down" across multiple fields, resulting in output with an irregular frame rate.

Motion picture film cameras produce progressive images, usually at 24 frames per second. In order to display those images on NTSC television, whose frame rate is 29.97 frames per second interlaced (59.94 fields per second), each frame must be split into alternating groups of 3 and 2 fields. This is known as 3:2 pull-down.

Certain high definition tape formats, such as HDCAM allow frame rates other than 29.97. Therefore, it's possible when using PSF to store "true" 24 frames per second progressive images without pull-down, which then play back at the original frame rate. Thus the 24psf and 23.976psf (for compatibility with NTSC) formats were devised, which exist on tape as 48 (or 47.952) fields per second interlaced. When set up correctly, a progressive scan monitor will read these interlaced fields two at a time, and display each pair as a single progressive frame, temporally identical to the source. PSF content can also be played back on interlaced displays, but the image will flicker.

HDTV 1080psf30

Will scan at a frame rate of 30Hz.

HDTV 1080psf29.9

Will scan at a frame rate of 29.9Hz.

HDTV 1080psf25

Will scan at a frame rate of 25Hz.

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9.10 Versatile Dual HD-SDI

The Video Outputs parameters, in the Phantom Video Player Settings dialogue window, are used to define the video feed mode. Presently there are four feed modes supported, including:

- Single-Feed (4:2:2)
- Single-Feed Mode with Dual Link 4:4:4
- Dual Feed Mode (4:2:2)
- Dual-Feed with 4:4:4

The Versatile Dual HD-SDI feature allows maintaining a live video feed while simultaneously playing back recorded images from the camera memory. The feature has also improved the handling of active metadata, or video image adjustments, to allow proper handling during pipelined recording/ playback operations.

NOTE

Presently only the Phantom v740, v640, v310, and v12.1 Camera supports this feature.

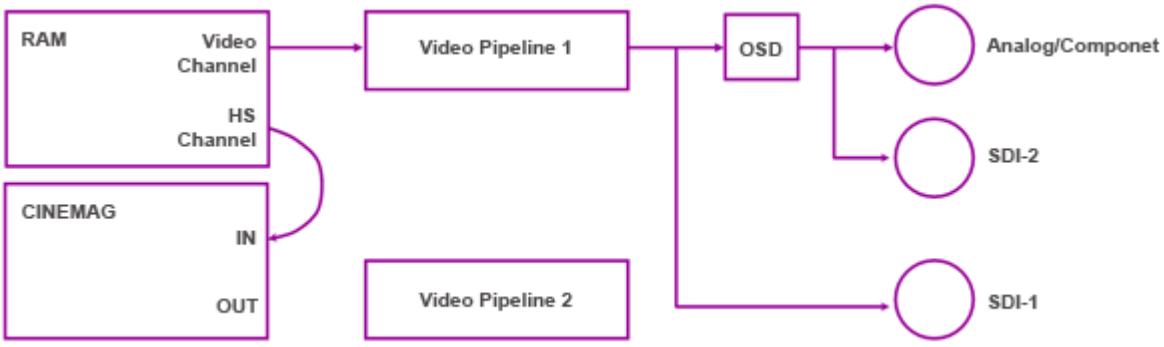
Also, the handling of video adjustments has changed. Previously, when changing any of the values, they would apply to the video image, both live and playback. Now, changing a video adjustment value will only apply to the live image out of the camera, in either single-feed or dual-feed mode. For playback, the values that were active when the cine was recorded will be used.

Below is a description of each of the video feed operational modes:

Single-Feed Mode (4:2:2)

This mode provides both the live and playback feeds, from the RAM, over the video memory channel. This is exactly how the video feeds were handled previously. The high-speed channel is used as the recording source for the Phantom CineMag, if fitted.

Only one video pipeline is used at a time.



Routing of image data when outputting images from the camera's RAM

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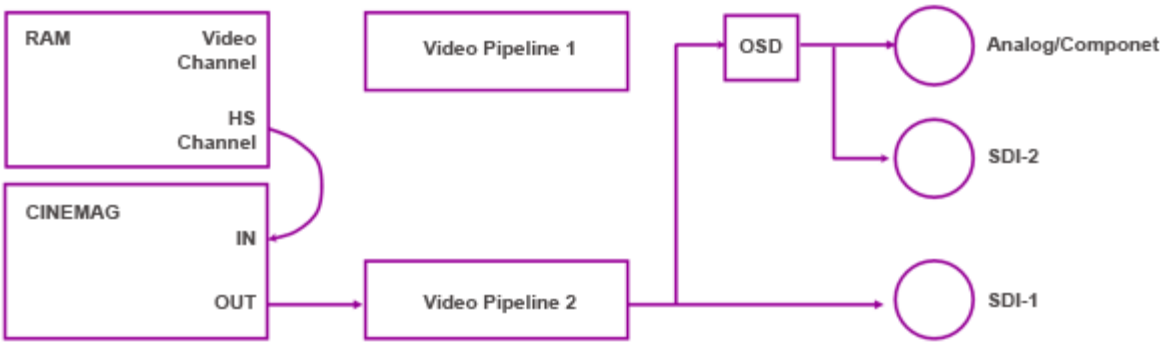

Routing of image data when outputting images from Phantom CineMag

When the camera is placed into the Single-Feed (4:2:2) Mode images can be read from the camera's RAM over two totally independent channels, the:

- Video Memory Channel
- High-Speed Memory Channel

The camera has two identical video pipelines used to handle image debayering, and all color adjustments. The video output of these pipelines can be routed to three outputs:

- One analog/component
- SDI-1, (Serial Digital Interface)
- SDI-2, (Serial Digital Interface)

On-screen annotations can be inserted on the signal going to the analog/component output and/or SDI-2. There is no OSD, (On-Screen Display), for SDI-1.

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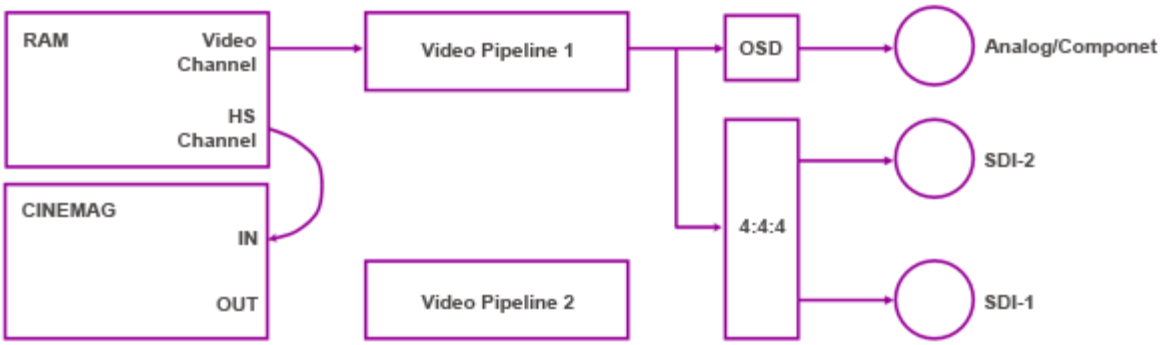
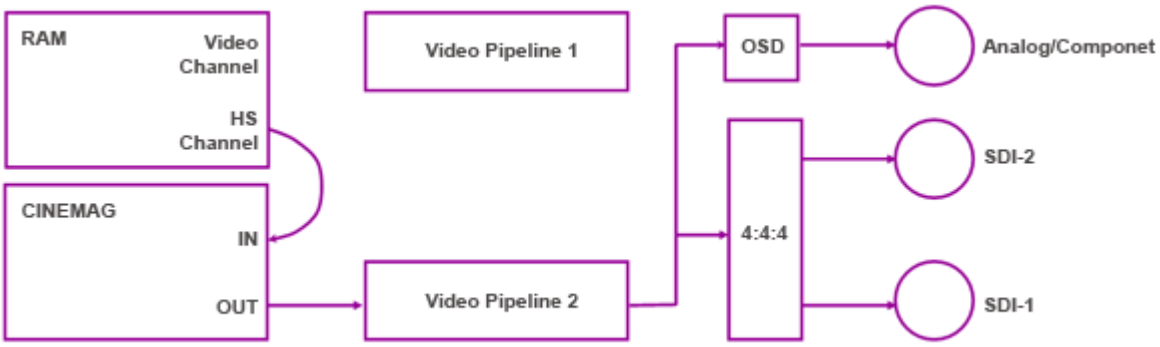
Single-Feed Mode with Dual Link 4:4:4

In this mode the SDI, (Serial Digital Interface), Outputs are used together as a dual-link output, allowing 4:4:4 image sampling.



Routing of image data when outputting images from the camera's RAM



Routing of image data when outputting images from Phantom CineMag

When the camera is placed into the Single-Feed with Dual Link (4:4:4) Mode images can be read from the camera's RAM over two totally independent channels, the:

- Video Memory Channel
- High-Speed Memory Channel

The camera has two identical video pipelines used to handle image debayering, and all color adjustments. The video output of these pipelines can be routed to three outputs:

- One analog/component
- SDI-1, (Serial Digital Interface)
- SDI-2, (Serial Digital Interface)

On-screen, (OSD - On-Screen Display), annotations can only be inserted into the analog/component signal.

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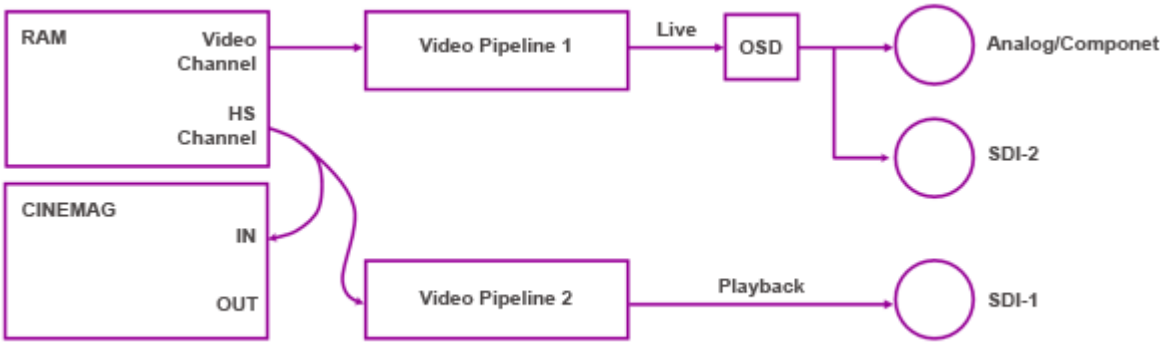
Dual-Feed Mode (4:2:2)

When the camera is placed into the Dual-Feed Mode the two video pipelines are used simultaneously. The video memory channel is used to source a live video feed, while either the high-speed memory channel or the Phantom CineMag is used to source the playback feed.

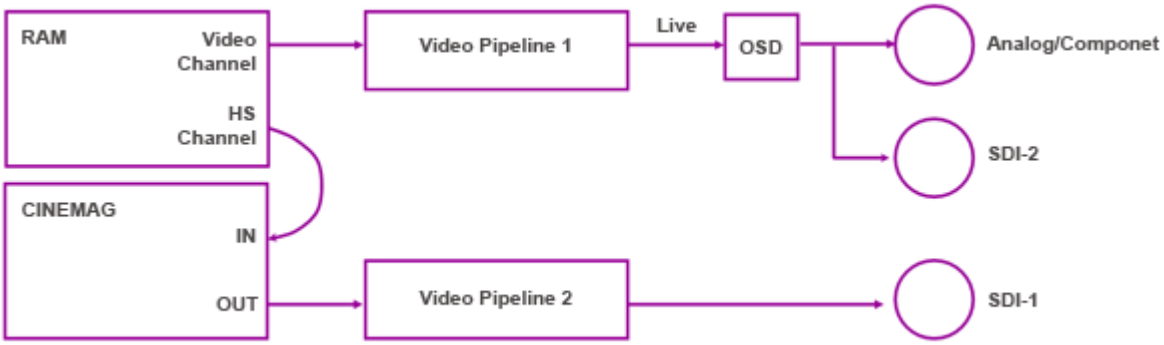
Both the analog/component output and the SDI-2, (Serial Digital Interface-2), outputs always carry the uninterrupted live feed. OSD, (On-Screen Display), information can be inserted on either of these outputs. SDI-1 is reserved for the playback feed.

NOTE

If no playback is taking place, a black image is outputted.



Routing of image data when outputting images from the camera's RAM



Routing of image data when outputting images from Phantom CineMag

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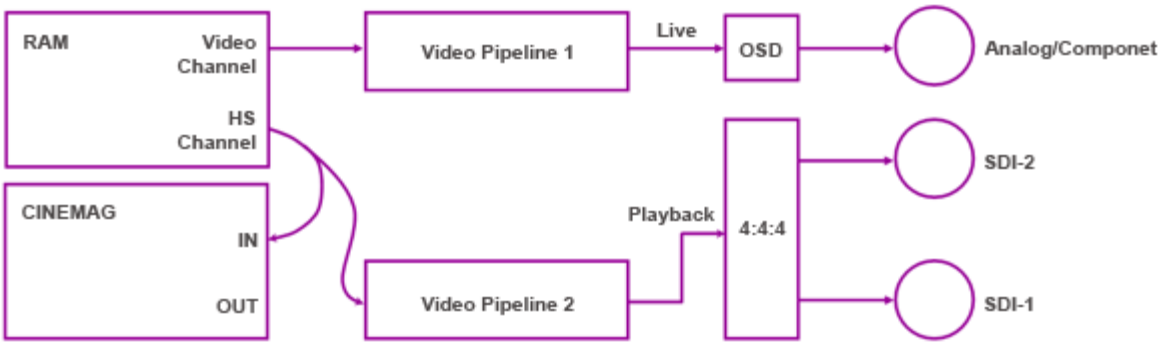
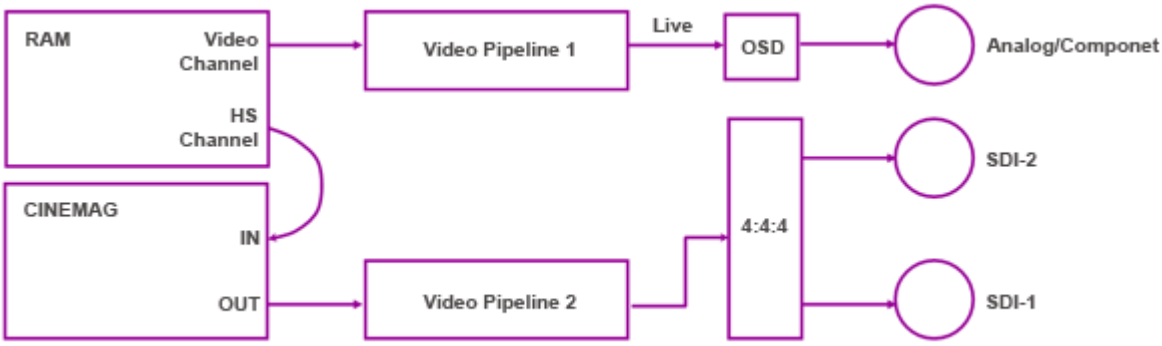
Dual-Feed Mode with 4:4:4

In the Dual-Feed Mode with 4:4:4 the two SDI, (Serial Digital Interface), outputs are used together as a dual-link output allowing 4:4:4 image sampling. The live feed, and optional On-screen Display, (OSD), annotations are sent to the analog/component output, while the playback feed uses the dual-SDI outputs.



Routing of image data when outputting images from the camera's RAM



Routing of image data when outputting images from Phantom CineMag

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Important System Interactions

Various interactions between the functional block depicted in the video feed operational mode descriptions require the following rules to be put into place:

- All outputs are set to the same video format.
- Test bars are sent on all outputs at the same time.
- OSD, (On-Screen Display), information can be inserted only on the analog/component out and SDI-2, (Serial Digital Interface-2).
- In dual-feed modes, only one of the following operations can take place at any given time:
  - A Playback from RAM
  - A playback from the Phantom CineMag
  - Recording or Saving to the Phantom CineMag
  - Downloading from the Phantom CineMag via Ethernet

Video-Feed Mode Selection Table

Video-Feed Mode definition is performed in the Phantom Video Play>Pvp Settings dialogue window.

VIDEO- FEED MODE	VIDEO OUTPUTS		
	4:4:4	ALL OUTPUTS PLAY SELECTED CINE	SDI2 PLAYS SELECT CINE ANALOG AND SDI1 PLAY LIVE
Single-Feed Mode (4:2:2)	Disabled	Enabled	Disabled
Single Feed Mode with Dual-Link 4:4:4	Enabled	Enabled	Disabled
Dual-Feed Mode	Disabled	Disabled	Enabled
Dual-Feed Mode with 4:4:4	Enabled	Disabled	Enabled

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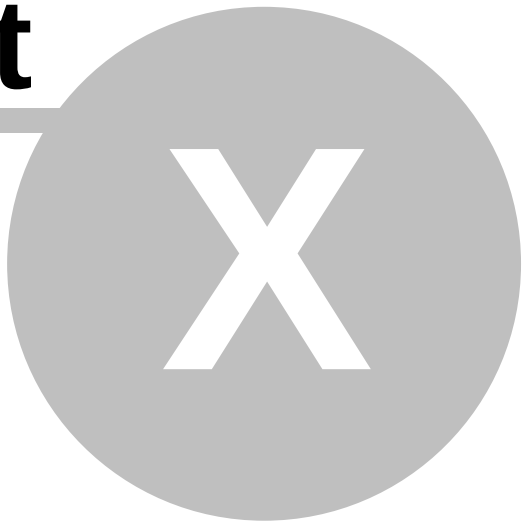
Part



10 Firmware Requirements

CAUTION

Before installing this new software version, you must verify the firmware version currently installed in your camera.

The minimum firmware required, as of 26-February-2010 Rev.A, is:

CAMERA	FIRMWARE (PH7)	FPGA (PH.BIN)	KERNEL	DISCONTINUED DATE	OBSOLETE DATE
Phantom 65	661	78937	16053		
Phantom HD	661	857065	16053		
Phantom v710	651	272065	16053		
Phantom v640	651	326101	16053		
Phantom v310	651	272177	16053		
Phantom v210	653	272177	16053		
Phantom v12.1 (Rev.E GTB440)	651	272177	16053		
Phantom v12.0 (8G - 16G)	567	47805	-	29-Dec-2008	30-Dec-2011
Phantom v12.0 (32G)	567	47805b	-	29-Dec-2008	30-Dec-2011
Phantom v10	655	343058	16053		
Phantom v9.1	655	343058	16053		
Phantom v9.0	381b	34842	757	24-Aug-2007	23-Aug-2010
Phantom v7.3	655	74062	16053		
Phantom v7.2	486	47549	757	27-May-2007	26-May-2010
Phantom v7.1	381	6749	757	27-May-2007	26-May-2010
Phantom v7.0g	381	6749	757	27-May-2007	26-May-2010
Phantom v6.2	322	23836	757	24-Oct-2007	23-Oct-2010
Phantom v6.2	322	24844	757	24-Oct-2007	23-Oct-2010

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Phantom v6.1	-	-	-	24-Oct-2007	23-Oct-2010
Phantom v5.2	639	58758	16012	22-Aug-2009	22-Aug-2010
Phantom v5.1	502	14842	757	19-Feb-2008	18-Feb-2011
Phantom v5.0	-	-	-	19-Jun-2007	18-Jun-2010
Phantom Miro4	635	1203	1578		
Phantom Miro Airborne	635	1203	1578		
Phantom Miro3 (800x600)	667	1203	1578		
Phantom Miro3 (512x512)	543	1068	916		
Phantom Miro2	635	1203	1578		
Phantom Miro1	635	1203	1578		
Phantom Miro Ex1	635	1203	1578		
Phantom Miro Ex2	635	1203	1578		
Phantom Miro Ex4	635	1203	1578		
Phantom v4.3	502	6749	757	01-Apr-2008	31-Mar-2011
Phantom v4.2	502	6749	757	01-Apr-2008	31-Mar-2011
Phantom v4.1	-	-	-	19-Jun-2007	18-Jun-2010
Image3 w/Phantom v10	437	V10.10100	-		
Image3 w/Phantom v9.1	437	V10.10100	-		
Image3 w/Phantom v9.0	354	11093	-		
Image3 w/Phantom v7.3	437	V73.11097	-		
Image3 w/Phantom v7.2	313	11095	-		
CineStation w/HD	589	40325	16053		
CineStation w/v710	651	40342	16053		
CineStation w/v640	651	50145	16053		
CineStation w/v310	651	40342	16053		
CineStation w/v210	653	40342	16053		
CineStation w/v12.1	651	40342	16053		

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Currently in production
Discontinued camera model, firmware is fixed however Phantom support for three years
Obsolete model, no more development, firmware is fixed

HOW TO FIND THE CAMERA'S FIRMWARE VERSION

1. Connect the camera; Open the current version of Phantom software.
2. Open the Help>About menu
3. If the firmware version reported is an earlier version than the one listed above the firmware must be upgraded before using this new software. Please contact Technical Support for assistance

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Index

- A -

ac (alternating current)
  adapter 38, 49
acceleration 38
acquisition
  settings/parameters 87, 171, 175, 348, 381
ADC - Analog-to-Digital Conversion 306
administrative privileges 45
alpha channel 381
altitude 38
ambient temperature 38
analog 87, 306, 392
  channels 193, 222
  gain 193
  input 193
  protocol(s) 70
  sample 222
  signal button 222
  signal(s) 102, 110, 114, 118, 123, 154, 158, 220, 222
  television 389
  video 186, 300
aperture 87, 176
area of interest 87, 199, 203
aspect ratio 87, 306, 335, 381, 389
auto
  detection 51
  exposure 87, 102, 171, 173, 180, 199, 289, 348, 364
  play video out 87, 186
  playback 34
  save 34, 87, 186, 231, 333
  scroll 222
  shutter 87, 171, 173, 186
  tile 152, 153
  trigger 38, 87, 171, 173, 203, 244, 247, 271, 289, 348, 364
automatic lens control mount 87, 176

- B -

background color 149
battery 34, 38, 49, 62, 73, 145, 244, 247, 287
binary
  channel(s) 193, 222
  format 381
  signal acquistion 87, 193
  signal(s) 102, 193, 222
bipolar range 193
bit depth 38, 83, 87, 102, 110, 114, 118, 144, 149, 154, 158, 162, 174, 182, 220, 256, 259, 306, 381
BNC - Bayonet Neill-Concelman Connector 57, 62, 87, 187, 231
border data 57, 110, 114, 118, 123, 154, 158, 220
brightness 144, 162, 300, 306, 366
broadcast 142

- C -

calibration 48, 62, 73, 87, 138, 139, 164, 171, 173, 180, 199, 203, 300, 348, 380, 381
camera
  menu 87, 134, 136, 138, 139, 140, 141, 142
  name 73, 102
  options 231, 287
  pool 145
  serial number 173
  status 173, 287
cancel 148, 149, 164, 171, 173, 175
capture
  button 57, 87, 231
  cable 57, 62, 187, 196, 197, 281
  cine 256, 282, 326
  connector 87, 197, 364
  indicator 275
  mode/state 38, 87, 268, 332, 341
  parameter(s) 71, 84
  time 38
CAR (Continuous Adjustable Resolution) 87, 177
cine
  count 231
  data 122
  duration 70, 87, 110, 114, 118, 123, 154, 158, 177, 182, 201, 220, 244, 256, 259, 265, 287, 302, 306, 312, 316, 320, 323, 326, 335
  editor bar 102, 215, 217
  field 87
  format(s) 34, 70, 381
  info/information 102, 171, 221, 381
  menu 57, 109, 110, 114, 118, 122, 123
  playback 70, 102
  selection 211
cinematography 149
clock
  external 187

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clock
internal 34, 87, 169, 350
IRIG-B 34, 87, 187
master 187
primary 87
close 47, 48, 51, 57, 87, 134, 136, 141, 142, 145, 162, 169, 212, 213, 217, 222, 231, 240, 344
CMOS - Complementary Metal Oxide Semiconductor 70
color
adjustment(s) 34, 144, 162, 164, 247, 278, 392
map(s) 381
CompactFlash 34, 62, 247, 274, 278, 280, 282, 283, 285, 287
compress/compression
cmp 381
lossy 110, 114, 118, 123, 154, 158, 220, 381
quality 123, 381
connectors
range data 110, 114, 118, 123, 154, 158, 220
continuous recording 34
contrast 34, 87, 144, 162, 174, 306, 366, 381
convert&process 34
coordinates 71, 83, 87, 199, 203
copy
parameters to 73, 87, 136
crystal oscillator 87, 187
CSR- Current Session Reference 38, 57, 73, 87, 138, 139, 171, 173, 180, 186, 199, 203, 279, 348

- D -

data
acquisition/acquisition unit 34, 102, 110, 114, 118, 123, 154, 158, 193, 220, 222
date and time 87, 110, 114, 118, 123, 154, 158, 169, 170, 220, 244, 302, 312, 316, 320, 323, 326, 374
dc (direct current)
power supply 38, 49
delay time 182, 187
delete 47, 57, 62, 71, 73, 84, 140, 148, 166, 209, 231, 243, 256, 264, 265, 267, 268, 274, 282, 284, 287
device driver(s) 34
DT3010 193
DT9802 193
digital
camera(s) 381
cine format 70
device 38
high speed imaging system 12
motion picture(s) 389
photography 14, 381
protocol 70
timing standard for motion pictures 389
video 381
zoom 79
dimension(s) 87, 164, 177, 277, 306, 381
disk
cleanup 47
defrag (defragmentation) 47
DNS - Domain Name Server 49
DRAM - Dynamic Random Access Memory 57, 62, 71, 73, 79, 83, 84, 87, 102, 114, 122, 123, 140, 158, 166, 174, 175, 182, 184, 185, 186, 209, 210, 211, 213, 220, 229, 231, 236, 238, 256, 259, 264, 265, 267, 268, 281, 282, 284, 285, 287, 306, 320, 323, 326, 330, 333, 335, 374
dynamic range 87, 174, 366

- E -

edit 110, 114, 118
bar 215, 217
cine/image data 57, 62, 71, 79, 84, 102, 114, 123, 154, 158, 186, 211, 212, 213, 215, 217, 220, 228, 231, 236, 243, 259, 268, 274, 284, 287, 332, 340
current camera date 87
HD/65 Menu Selector 326
image 163
Miro Display Screen 62, 243, 256, 259, 262, 284, 285
Miro Menu Selector 256, 259, 284
EDR - Extreme Dynamic Range 57, 73, 87, 102, 110, 114, 118, 123, 149, 154, 158, 171, 173, 180, 199, 220, 348
elapsed time from
image# 102
trigger 102
EMC - Electro Magnetic Charge 38
end of recording actions 87, 186, 231, 287
endless loop 87, 102, 212, 213, 238
enhanced mode 134, 145
Ethernet 53, 392
cable 49, 57
camera(s) 53, 79, 350
connector 49
indicator 275
NIC (Network Interface Card) 45
event
marker 102
signal 193
exit 51, 53, 142, 148, 162, 231, 287
exposure 73, 243
index 247, 278, 279, 281, 306, 335

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exposure 73, 243
PIV (Particle Imaging Velocimetry) 87, 184
setting/parameter/selector 87, 110, 114, 118, 123, 154, 158, 220, 244, 302, 312, 320, 323, 326
time 57, 62, 87, 102, 110, 114, 118, 123, 136, 154, 158, 171, 178, 180, 181, 184, 187, 199, 201, 220, 277, 279, 281, 306, 348
unit/preference setting 149
external
clock 187
storage 62, 154, 254, 285, 326

- F -

file
format(s) 57, 102, 110, 114, 118, 123, 154, 158, 220, 377, 381
name(s) 34, 57, 73, 79, 102, 110, 114, 118, 123, 139, 149, 154, 158, 220, 374
FireWall 57
firmware 73, 141, 173, 348
control (Nucleus) 73, 145
upgrade/update 38, 145
flash memory 34, 48, 85, 87, 102, 118, 122, 123, 138, 166, 182, 220, 312, 330, 380
dialogue window 229, 231, 240, 306, 333, 335
erase 73, 140, 240
module 73, 140
module/unit 231
floppy drive 73, 79, 102, 118
focus 14, 87, 176, 243, 244, 300, 302
of interest 87, 199
frame(s) 83, 149, 182, 212, 217, 243, 244, 250, 254, 256, 259, 262, 264, 265, 267, 268, 276, 278, 281, 282, 284, 285, 287, 302, 312, 320, 323, 326, 330, 335, 338, 344, 364
buffer 185, 229, 231, 333, 335, 374
delay 87, 187
info selector 221
per second 213, 215
rate profile 201
rate tables 87, 178, 187, 350
rate(s) 38, 57, 70, 87, 102, 110, 114, 118, 123, 154, 158, 178, 187, 193, 201, 220, 229, 271, 276, 289, 306, 348, 350, 389
starddle time 87, 184
sync/sychronization 87
f-stop 87, 176
f-sync 34, 187
full screen 149, 271, 289

- G -

gain 193, 300, 306
gamma 34, 144, 162, 300, 306, 335, 366, 381
gray scale 174, 366
grid 366, 381
horizontal 222
vertical 222
ground
strap 34

- H -

hard drive 47, 48, 57, 73, 79, 102, 110, 114, 118, 139, 154, 158, 173, 217, 220, 380
size 45
HDTV - High-Definition Television
1080i 389
1080p 389
1080psf 389
720p 389
head(s) 110, 114, 118, 154, 158, 220
help
file 12, 13, 79, 163
menu 153
Phantom 65 or Phantom HD Control via "On_Camera" Control Buttons 298
Phantom Camera Control (PCC) Application 70
Phantom Cine Control Panel Application 344
Phantom CineMag 228
Phantom Miro Control vai "Touch-Sensitive" LCD Screens 242
Phantom Video Player Application 79, 162
histogram 73, 79, 144, 162, 366
host
OHCI IEEE 1394 controller 45, 51
hue 300, 306, 366

- I -

IBM-PC 45
IEEE 1394
camera(s) 34, 38, 51, 53, 73, 79, 145
drivers 34, 38
image(s)
analysis 381
area 87, 199, 203, 244, 302
box 110, 114, 118, 154, 158, 220
color 164, 247, 278

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image(s)
count 34, 87, 110, 114, 118, 123, 154, 158, 182, 201, 220, 306
data 57, 73, 79, 83, 84, 87, 102, 110, 114, 118, 136, 144, 154, 158, 174, 175, 182, 185, 186, 193, 199, 203, 209, 210, 213, 220, 229, 244, 250, 252, 254, 256, 259, 264, 267, 268, 284, 287, 302, 306, 312, 316, 320, 323, 326, 333, 335, 374, 381, 392
file(s) 34, 110, 114, 118, 149, 154, 158, 163, 220, 374, 377, 381
frame(s) 193
per second 12
pixel bit depth 110, 114, 118, 154, 158, 174, 220
processing 34, 73, 79, 144, 149, 162, 366, 381
range 87, 231
reference point 256, 259, 282
sensor 48, 306, 380, 381
storage area 87
Image-Based Auto-Trigger 34, 38, 87, 171, 173, 203, 244, 247, 271, 289, 348, 364
indicators
back reference status 173
CineMag status 302, 312, 316, 320
current session reference status 171
live status 83
play status 83
ready 268
record 231
recording to memory location 312
recording to memory locator 250, 316
segment status 268
wait 252, 281
information fields 110, 114, 118, 123, 154, 158, 193, 220
installation
IEEE 1394 Hardware and Driver 51
Phantom Camera Control Software 48
inter-field motion 389
interlaced
media 389
scanned 389
internal clock 34, 87, 169, 350
Internet Protocol (TCP/IP) 49, 53, 57
interval time 182
IP Address 57
Phantom Control Unit 49
IRIG - Inter Range Instrumentation Group 34, 87, 102, 187, 197, 350

- L -

Laplacian 366
laser 38
LCD (Liquid Crystal Diode) Display 242, 243, 244, 247, 250, 256, 259, 262, 274, 275, 279, 280, 281, 282, 285
lens
cap/cover 62, 171, 173, 279, 335
mount 171
lighting 34, 62, 136, 144, 162, 278, 306
linear
environment 306
local time 87, 225
loop mode 185, 229, 231, 306, 316, 333, 335, 338, 374
low light 87, 181
luminance 366

- M -

mark
in 62, 102, 110, 114, 118, 154, 158, 217, 220, 231, 238, 256, 259, 262, 284, 287, 320, 323, 326, 340, 366
out 62, 102, 110, 114, 118, 154, 158, 217, 220, 231, 238, 256, 259, 262, 284, 287, 320, 323, 326, 340, 366
master
camera 87, 187
clock 187
measure/measurement
color levels 381
units of 193
memgate 87, 196
memory
buffer 34, 38, 62, 85, 110, 114, 154, 175, 182, 209, 220, 231, 236, 238, 244, 250, 252, 254, 256, 259, 267, 268, 276, 281, 282, 284, 287, 302, 306, 312, 316, 320, 323, 326, 335, 339, 340
gauge 244, 250, 252, 256, 259, 302, 312, 320, 323, 326
location 250, 252, 256, 259, 312, 316, 320, 323, 326
merge/merging 34
microprocessor 45
Microsoft 13, 38, 45, 57, 381
monitor 34, 38, 79, 87, 144, 162, 186, 209, 231, 238, 244, 250, 252, 254, 256, 300, 301, 302, 312, 316, 334, 340, 389
monochrome 102, 144, 162, 306, 366
motion 87, 102, 203, 217, 259, 284, 289, 306, 389
movie 34, 374, 381
multi-

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multi-
camera 71, 84, 136, 187, 364
cine 73, 79, 87, 102, 114, 118, 123, 136, 140, 158, 171, 175, 220, 247, 265, 267, 268, 274, 283, 287
IOIOG (Junction Box) 187
IOIOI (Junction Box) 187

- N -

new view
button 344
non-interlaced 389
non-volatile memory 87, 173, 186, 348
NTSC - National Television System Committee 381, 389

- O -

operating system(s) 45, 57, 87, 280, 381
oscillator 87, 187, 350
OSD (On Screen Display) 301, 392
analog 300
digital 300
opaque 300

- P -

PAL - Phase Alternating Line 381, 389
pause 57, 62, 102, 213, 215, 217, 231, 236, 256, 282, 326, 332, 339, 344
PCI (Peripheral Component Interconnect) 45, 51
pedestal 306, 335
peripheral(s) 73, 79, 102, 110, 114, 118, 154, 220
Phantom 82, 109, 122, 136, 140, 141, 165, 169
65 67, 87, 134, 145, 177, 228, 229, 231, 236, 238, 298, 300, 330, 332, 333
Camera Control (Legacy) Software 34, 229, 231, 236, 238, 240, 333
Camera Control (PCC) Application 34, 57, 70, 71, 229, 231, 236, 238, 240, 333
Camera Control Software/Application 12, 13, 34, 38, 45, 48, 51, 56, 57, 62, 73, 79, 83, 84, 85, 87, 102, 109, 110, 114, 118, 123, 142, 144, 145, 148, 149, 152, 153, 154, 158, 165, 166, 170, 171, 177, 178, 180, 182, 184, 193, 210, 212, 213, 220, 271, 274, 276, 277, 281, 283, 285, 287, 289, 344, 348, 366, 374, 377, 380, 381
Camera Control Unit Requirements 45
camera driver 51
Cine Control Panel Application 344
CineMag 34, 73, 102, 110, 114, 118, 123, 140, 154, 158, 175, 185, 186, 213, 220, 228, 229, 231, 236, 238, 240, 301, 302, 306, 312, 316, 320, 323, 326, 330, 333, 335, 374, 381, 392
CineStation 134, 145, 300
Control Unit 44, 47, 49, 51, 53, 57, 62, 87, 134, 154, 170, 173, 174, 182, 193, 209, 238, 282, 283, 285
End User Licenses Agreement (EULA) 15
File Naming Convention 34, 110, 114, 118, 154, 220, 374, 377
Graphical User Interface (GUI) 149
HD 87, 134, 145, 177, 185, 228, 229, 231, 236, 238, 298, 300, 330, 332, 333, 374
HD Gold 87, 177
HD-Series 67
icon 51
Image3 134, 145
logo 244, 250, 252, 254, 256, 278, 281, 282, 287, 302, 306, 312, 316, 320, 323, 326
Miro 1 62, 134, 145, 250, 277, 283, 287
Miro 2 87, 134, 145, 177, 250, 268, 283, 289
Miro 3 87, 102, 134, 145, 177, 186, 197, 222
Miro 3.1 197
Miro 4 87, 102, 134, 145, 177, 186, 197, 222, 250, 268, 283, 289
Miro Airborne 38, 87, 177, 186
Miro eX1 38
Miro eX2 38, 87, 177, 289
Miro eX3 87, 177, 186
Miro eX4 38, 87, 177, 186, 197, 289
Miro-Series 34, 45, 62, 242, 247, 265, 274, 281, 283
Nucleus Application 73, 145
Serial Tag Number (STG) File 34, 48, 73, 134, 138, 380
v10 38, 45, 87, 102, 134, 145, 177, 222
v12.1 38, 228, 392
v12-Series 45, 87, 102, 134, 145, 177, 184, 222
v210 38, 45, 87, 102, 134, 145, 177, 184, 222, 228, 392
v310 38, 45, 87, 102, 134, 145, 177, 184, 222, 228, 392
v4.0 51, 87, 177
v4.1 51, 87, 175, 177, 196
v4.2 73, 87, 134, 145, 175, 177
v4.3 73, 87, 134, 145, 177
v4-Series 45
v5.0 51, 87, 175, 177, 196
v5.1 73, 87, 102, 134, 145, 177, 222
v5.2 38
v5-Series 45
v6.0 51, 87, 175, 177, 196
v6.1 51, 175
v6.2e 87, 134, 145, 177

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Phantom 82, 109, 122, 136, 140, 141, 165, 169
v640 38, 45, 87, 102, 134, 145, 177, 184, 222, 228, 392
v6-Series 45, 110, 114, 118, 154, 158, 220
v7.0 49, 73, 87, 145, 177
v7.1 73, 87, 145, 177
v7.2 73, 87, 145, 177
v7.3 38, 87, 134, 145, 177
v710 38, 45, 87, 102, 134, 145, 177, 184, 222, 228, 392
v7-Series 45, 102, 222
v9.0 73, 87, 145, 177
v9.1 38, 87, 134, 145, 177
v9-Series 45, 102, 222
Video Player Application 34, 79, 162, 300, 301, 392
v-Series 87, 184
PhantomZone 14
phase shift 87, 187
phcon 47, 73, 148
photography 14, 381
pickle switch 231
PIV - Particle Imaging Velocimetry 87, 184
pixel
area 87, 199, 203, 244, 278, 302, 306, 312, 316, 320, 323, 326
bit depth 110, 114, 118, 154, 158, 174, 220, 256, 259
increments 87, 177
level 87, 180
play/playback
buttons 79, 102, 217, 236, 344
control panel 57, 71, 73, 79, 82, 84, 85, 102, 110, 114, 118, 122, 123, 140, 154, 158, 165, 171, 211, 212, 213, 215, 217, 220, 221, 225
control selectors 282
image 282
mode 212, 213, 217
panel 71, 73, 79, 82, 83, 102, 109, 140, 141, 142, 144, 149, 152, 153, 154, 163, 164, 166, 168, 211, 212, 213, 215, 217, 220, 366
process 62, 102, 213, 231, 236, 256, 339, 344
rate/speed 62, 102, 212, 213, 215, 217, 282, 344, 381
screen/window 110, 114, 118, 154, 158, 220, 256, 326
selector 62, 254, 282
tab 57
time 256, 259
to video 87
post trigger 57, 83, 87, 102, 149, 182, 187, 201, 210, 215, 217, 244, 250, 252, 254, 256, 259, 268, 276, 281, 282, 302, 306, 312, 316, 320, 326, 335, 338
power 49, 51, 53, 142, 231, 302
battery 34, 145
consumption 83
interruption 73, 102
management 38
off confirmation screen 287
off display 62, 243, 247, 278, 279, 280, 281, 287, 289
off selector 247
on/trigger button 62, 281
selector 287
status 244
supply 34, 38, 57, 62, 244
power up diagnostics 275, 312, 320
pre-trigger 38, 83, 229, 247, 268, 330, 333, 334
frame(s) 102, 182, 215, 217, 244, 256, 276, 282, 302, 326
image(s) 102, 182, 276, 306, 335
memory 250
pin is 87, 196
radial button 196
signal 87, 196, 209
preview
mode 57, 268, 302, 334
panel 57, 71, 73, 82, 83, 87, 114, 118, 122, 123, 138, 144, 158, 164, 165, 171, 173, 199, 203, 209, 210
Prewitt 366
primary
clock 87
print/printer(s) 13, 381
progressive scan 389
project number 102
PSF (Progressive Segmented Frame) 389

- Q -

quick search 102, 215, 217, 282

- R -

R,G,B (Red, Green Blue) 71, 83, 164, 366, 381
r/s (Run/Stop) mode 185, 229, 231, 306, 312, 316, 333, 374
RAM (Random Access Memory) 34, 45, 57, 73, 79, 102, 114, 123, 140, 145, 220, 231, 323, 326, 392
range data
connector 110, 114, 118, 123, 154, 158, 220
raster 381

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ready
indicator 268
signal 87, 197
signal ends at 87, 197
state 268, 287
rear panel 49, 51, 87, 231
record/recorded/recording 12, 48, 149, 344, 380
bit depth 174
button 209
cine/multicine 34, 57, 62, 71, 79, 82, 84, 85, 102, 110, 114, 118, 123, 144, 154, 158, 162, 171, 175, 185, 186, 215, 217, 220, 229, 236, 243, 250, 254, 256, 259, 267, 268, 274, 282, 284, 287, 320, 330, 338, 339, 340
direct to CineMag 87, 185, 229, 231
duration/time 73, 87, 102, 114, 177, 244, 256, 259, 265, 277, 287, 302, 312, 316, 320, 323, 326, 335
image(s)/frame(s) 57, 62, 73, 79, 83, 84, 87, 102, 110, 114, 118, 122, 123, 144, 154, 158, 162, 174, 175, 177, 178, 182, 185, 186, 197, 199, 203, 209, 210, 213, 220, 229, 236, 244, 250, 252, 254, 256, 259, 264, 265, 268, 276, 277, 281, 284, 287, 302, 306, 312, 316, 320, 323, 326, 333, 335, 339, 348, 366, 374, 392
indicator 231
mode/state 71, 84, 87, 209, 210, 231, 244, 274, 281, 287, 335
parameter(s)/setting(s) 38, 87, 244, 274, 302, 306, 330, 335
profile 87
range 102
rate/speed 177, 201, 277, 281
selector 62, 244
start/end of actions 186, 231
to memory location indicator 250, 312, 316
reference point 222, 256, 259, 282, 320, 326
reset angle 110, 114, 118, 123, 154, 158, 220
resolution 12, 38, 57, 62, 70, 79, 87, 102, 110, 114, 118, 123, 134, 145, 149, 154, 158, 171, 177, 178, 181, 182, 185, 187, 215, 217, 220, 229, 243, 244, 271, 276, 277, 289, 302, 306, 312, 316, 320, 323, 326, 333, 335, 348, 374, 389
rewind 102, 213, 217, 256, 344
RJ-45 49
RTO (Real Time Output) 87, 193

- S -

safety instructions 38
SAM-3 (Signal Acquisition Module-3) 34, 102, 110, 114, 118, 123, 154, 158, 193, 220, 222
sample(s)
number 222
per image 110, 114, 118, 123, 154, 158, 193, 220, 222
rate 38, 57, 62, 70, 87, 102, 149, 171, 177, 178, 180, 181, 182, 185, 187, 201, 215, 217, 244, 256, 259, 265, 276, 277, 281, 287, 302, 306, 312, 316, 320, 323, 326, 335, 374
value 193
saturation 164, 199, 300, 306, 366, 381
save as 34, 57, 110, 114, 118, 123, 139, 154, 158, 220
scandisk 47
serial
number 73, 87, 102, 134, 141, 145, 173, 187, 348
set time 87
Setup and Recording
parameter(s) 34, 38, 306, 330, 335
screen/window 110, 114, 118, 123, 154, 158, 220, 231
shutter
angle 149, 302, 306, 312, 316, 320, 323, 326, 335
signal(s)/signalling 34, 57, 62, 83, 87, 102, 110, 114, 118, 123, 149, 154, 158, 182, 184, 187, 193, 196, 197, 203, 210, 220, 222, 231, 244, 250, 252, 259, 268, 281, 289, 302, 306, 312, 316, 320, 323, 326, 364, 389, 392
simulated
camera(s) 73, 134
slave camera(s) 187
Sobel 34, 62, 71, 84, 187, 210, 250, 281, 330, 332, 338, 366
spark crank angle 110, 114, 118, 123, 154, 158, 220
standard mode 134, 145
static electricity 34
status
bar(s) 71, 83, 114, 118, 122, 123, 158, 164, 173, 199, 203, 209, 210, 231
camera 173, 287
indicator 83, 171, 173, 268, 302, 312, 316, 320
message(s) 231
window 231
step
backward 231, 236, 339
forward 231, 236, 339
STG (Serial Tag Number) 34, 44, 47, 48, 73, 134, 138, 139, 173, 348, 380
storage
area 87
buffer 87
device 62, 154, 254, 285, 300, 326
space 262
strobe 87, 197
sub-network mask 57
Supported File Formats

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Supported File Formats
AVI - Audio Video Interleaved 123, 377, 381
BMP - Bitmap 377, 381
Cine JPEG - Joint Photographic Expert Group 110, 114, 118, 123, 154, 158, 220, 381
Cine RAW 57, 110, 114, 118, 123, 154, 158, 220, 381
DNG - Digital Negative File Format 381
DPX - Digital Picture Exchange 381
JPEG - Joint Photographic Experts Group 381
JTIF - JPEG Tagged Interchange Format 381
LEAD - LEAD CMP Format 381
LEAD JFIF 381
LEAD JTIF 381
Multipage TIFF - Multipage Tagged Image File Format 123, 381
MXF NTSC- Material eXchange Format National Television System Committee 123, 381
MXF PAL - Material eXchange Format Phase Alternating Line 123, 381
Packed Cine RAW 381
PCX - PC Paintbrush 381
QuickTime - Apple QuickTime 123, 381
RAW - Vision Research Proprietary Format 381
TGA - Targa 381
TIFF - Tagged Image File Forma 381
switch closure 57, 62, 87, 231, 281
sync/synchronous/synchronization/synchronized 34, 38, 57, 87, 102, 169, 182, 187, 203, 271, 289, 350
system requirements 45

- T -

tape drive 73, 79, 102, 118, 300
TCP (Transport Control Protocol) 49, 53, 57
technical support 38, 49, 51, 53, 73, 145
temperature
ambient 38
color 306
storage 38
test 178, 392
image 300
sequence number 102
tile 71, 73, 82, 152, 381
time
available 231, 306
signal 316
stamp 87, 110, 114, 118, 123, 154, 158, 169, 193, 220, 244, 302, 312, 316, 320, 323, 326
translation 225
zone 87, 225
timing data 34
tracking mount(s) 110, 114, 118, 123, 154, 158, 220
trigger 38
button 62, 87, 209, 210, 231, 236, 250, 275, 281, 330, 335, 338, 339, 341
point 102, 244, 250, 252, 256, 259, 276, 281, 302, 312, 320, 323, 326
signal 57, 62, 83, 87, 149, 182, 184, 196, 197, 203, 209, 210, 244, 250, 252, 259, 268, 281, 289, 302, 306, 312, 320, 323, 326, 364
time 102, 231
TTL (Transistor-to-Transistor Logic) 57, 62, 87, 187, 196, 231, 281

- U -

update 38, 51, 87, 169, 229, 271, 289, 333
utc/gmt (universal time code/greenwich means time 87, 102, 170, 225

- V -

vector 366, 381
Versatile Dual HD-SDI 300, 392
Dual-Feed Mode 4:2:2 392
Dual-Feed Mode with 4:4:4 392
Single Feed Mode 4:2:2 392
Single-Feed Mode with Dual Link 4:4:4 392
video
compressor 123
format(s) 300, 381, 389, 392
out/output 79, 87, 162, 186, 300, 301, 392
signal(s)/signaling 389
system(s) 300, 389
ViewCine window 344
viewfinder 38, 231, 238, 250, 300, 301, 302, 306, 312, 316, 334, 340
Vision Research 14, 34, 38, 44, 48, 49, 51, 53, 62, 73, 110, 114, 118, 144, 145, 148, 154, 158, 162, 171, 187, 209, 220, 374, 380, 381

- W -

white balance 34, 62, 82, 144, 162, 164, 247, 278, 306, 335, 366, 381

- X -

XML (Extensible Markup Language) 110, 114, 118, 154, 158, 220, 381
XML header file 110, 114, 118, 154, 158, 220

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- Z -

zoom 57, 79, 152, 222, 231, 236, 300, 302, 330, 332, 334, 339

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